Ownership Matrix

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1.0 PURPOSE AND SCOPE
(5.1.2)

This standard establishes Tank Operations Contractor (TOC) requirements, conventions, and practices (standards) for preparing and revising engineering drawings entered into the Hanford Document Control System. These standards apply to engineering drawings prepared by and for the TOC that depict facilities, systems and components. (5.1.1, 5.1.3)

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header.

NOTE: Deviations to any requirements of this standard shall be requested from the standard document owner. Approved deviations shall be documented in the accompanying Standard Basis Document (e.g., RPP document). A Standard Basis Document shall be established prior to approval of any new deviations.

3.0 STANDARD

3.1 Control of Original CAD Data Sets and Manual Drawings

The TOC Central Design Authority & Standards organization manages access to the original computer-aided design (CAD) data sets. Central Design Authority & Standards identifies the custodians who have editing (revision) access to the original data sets. The Information Resource Management (IRM) Service Provider stores the original CAD data sets and hard copy drawings (tracings), and ensures that only authorized personnel are given access. Approved engineering drawings are transferred to the IRM Service Provider for microfilming and storage in accordance with TFC-ENG-DESIGN-C-09.

3.2 Drawing Categories

3.2.1 General

This standard applies to the engineering drawings that represent the technical information for the structures, systems, and components (SSC) required by the TOC. Drawings are identified by the "H-series" or "SK-series" drawing categories. The H-series drawings are for permanent facility SSC and usually include the drawings associated with modification, design, construction, and fabrication activities. The SK-series drawings involve temporary SSC that usually include the drawings for conceptual design, interface control, and equipment with a limited life. See Attachment A for historical drawing numbering system guidance.

3.2.2 H-Series Drawings

These drawings are permanent records and are subject to as-built requirements once field work is complete. The H-series drawings numbers are obtained from the Hanford Document Numbering System (HDNS). The H-series drawings include several different drawing types, such as arrangement, assembly, detail, schematic, wiring diagram, block diagram, flow diagram, installation, layout, plot plan, piping and instrumentation diagram (P&ID), and altered-item drawings. This list is not all-inclusive, and other types of drawings may be necessary for particular purposes. (5.1.4)

3.2.3 SK-Series Drawings

These drawings are prepared as temporary drawings for SSCs that will not become part of the permanent facility. The SK-series drawing numbers are obtained from HDNS. These drawings are record information and are subject to the same control requirements as H-series drawings. Examples of SK-series drawings:

- Experimental/prototypical equipment
- Limited-use test equipment
- Conceptual designs
- Interface control
- Temporary equipment supporting operations (usually in-service for less than two years).

If the depicted information (i.e., all or part) on an SK-series drawing is determined to be needed as part of the permanent facility SSC, then that information is integrated into the drawing baseline by one of the following methods:

1. Complete Drawing Transfer - Convert the SK-series drawing to a new H-series drawing by obtaining an entirely new drawing number from HDNS to replace the SK-series drawing number. If the converted SK-series drawing is being added as a new sheet(s) to an existing H-series drawing, then the new drawing sheet number is obtained from HDNS. Provide two-way traceability between the newly created H-series drawing and the SK-series drawing. Supersede the SK-series drawing through the ECN process.

2. Partial Drawing Transfer - Integrated the needed portion of SSC details from the SK-series drawing on to the affected H-series drawing through a drawing revision. Identify the two-way traceability between the affected H-series drawing and the SK-series drawing. Supersede the remaining portion of the SK-series drawing through the ECN process.

3.2.4 Vendor Drawings

Vendor-supplied drawings are submitted to the IRM Service Provider in accordance with TFC-ENG-DESIGN-C-21.

An altered-item drawing (see definition in Section 4.0) must be developed for vendor items that require modification as part of a design, or modification to items covered by a vendor item file. See Section 3.22.10.

3.3 Computer-Aided Drafting

3.3.1 CAD Program

AutoCAD Release 16 (AutoCAD 2005) or earlier versions is the standard for preparing all engineering drawings that will be released into the Hanford Document Control System. Drawings developed on CAD programs other than AutoCAD[1] must be converted to the standard AutoCAD program ".DWG" format prior to releasing the data files to the IRM contractor. Generate final plots from the ".DWG" formatted file.

1 Registered trademark of Autodesk.

3.3.2 AutoCAD Discipline Layering Standards

Uniform layering standards are established to make it easier to exchange AutoCAD data sets among organizations and companies. Consistency allows logical separation and identification of drawing data, and permits the user to view and plot related aspects of a drawing separately or in combination.

3.3.2.1 Layering

Designating layers by color and line type is the preferred standard. Layers can also be assigned on an entity basis. This section and Attachment B describe the standards to be used when assigning layers.

Drawing setup files (also identified in AutoCAD documentation as "prototype drawings") establish specific discipline layers for routine use. Attachment B, Tables 1 through 9, covers the following:

- Table B-1, General Layering for All Disciplines
- Table B-2, Architectural Drawings
- Table B-3, Civil/Structural/Environmental Drawings
- Table B-4, Electrical Drawings
- Table B-5, Fire Protection Drawings
- Table B-6, HVAC Drawings
- Table B-7, Instrumentation & Control (I&C) Drawings
- Table B-8, Mechanical Drawings
- Table B-9, Piping Drawings.

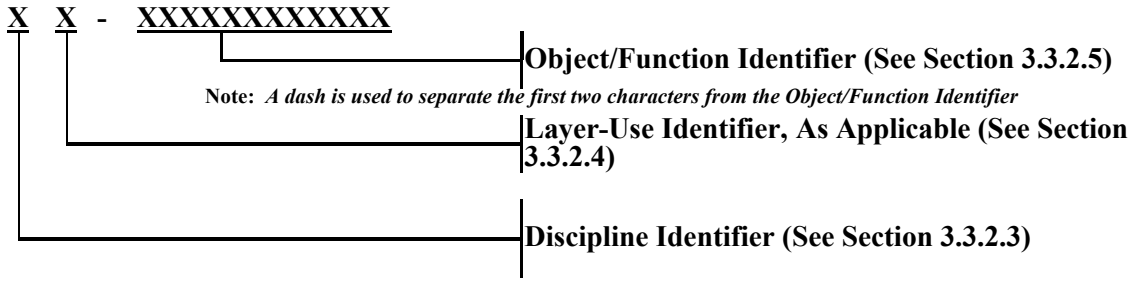
For mapping and mapping related drawings, use the computer automated mapping and information system (CAMIS) layering standards.

Third-party software approved for use by the TOC, with built-in layering standards, is exempt from this layering standard requirement. However, to support third-party software, a special plotter configuration may be required.

3.3.2.2 Layer Naming Standard

Figure 1 shows the layer-naming standard that is to be used on AutoCAD-developed drawings.

Figure 1. Layer Naming Standard.



3.3.2.3 Discipline Identifier

This identifier defines the specific engineering discipline. A unique identifier enables users to quickly distinguish discipline layers within a drawing file and provides a logical separation of discipline information, as defined by Figure 2 (also see Figure 1).

Figure 2. Discipline Identifiers.

Identifier	Discipline	Identifier	Discipline
A	Architectural	H	HVAC
C	Civil	I	Control Systems
E	Electrical	N	Mechanical/Machine
F	Fire Protection	P	Piping
G	General (non-specific applications)	S	Structural

3.3.2.4 Layer-Use Identifier

The layer-use identifier designates what the layer depicts (e.g., primary objects, existing equipment, hidden objects, or text). The layer-use identifier is used only when a single line type and color is assigned to an individual layer as defined by Figure 3 (also see Figure 1). Normally, this identifier is not used for entity-based layers.

Figure 3. Layer-Use Identifiers.

Identifier	Layer-Use	Line Type
O	New or main object, visible lines, primary line work	Continuous
E	Existing equipment - For A-E use to depict existing facility/ equipment	Phantom
F	Future items - For A-E use to depict future items	Dashed
D	Demolition - For A-E use to depict demolition information	Dashed
T	Test	Continuous
M	Dimensioning (in accordance with ASME Y14.5M)	Continuous
C	Center Lines	Center
H	Hidden items/lines	Hidden
X	Hatching	Continuous
P	Mechanical details depicting repeated details (e.g., spring and screw thread details or alternate positioning of absent parts)	Phantom
R	Reused equipment − For A-E use to depict Reused facility/equipment	Continuous
V	Viewing and Cutting Planes	Varies

NOTE: Selecting the Polyline feature will limit the minimum Polyline width to the plotter line width that is established by the line color.

Certain conditions may make it desirable to link layer data together but still keep the data separate. For example, if a piping modification required new equipment to be installed after the old equipment is removed, the layer-use identifier could be used to separate data as follows:

- Add auxiliary details, as needed. Example: 3DET
- PE-PIPING - Existing piping
- PD-PIPING - Piping to be removed (demolition)
- PO-PIPING - New piping to be installed
- PF-PIPING - Piping to be considered for future installation.

3.3.2.5 Object/Function Identifier

The object/function identifier provides a semi-descriptive name of layer contents or function. The identifier may be as many as 28 characters in length and may contain letters, numerals, and special characters, such as $ (dollar), - (hyphen), and _ (underscore). (See Figure 1 and Attachment B, Tables B-1 through B-9.)

When words used in the object/function identifier are abbreviated, use of the latest edition of American Society of Mechanical Engineers (ASME) Y14.38, "Abbreviations and Acronyms," is the preferred standard.

3.3.2.6 Plotter Pen Assignments

Plotters are configured to produce line widths based on colors. Designating specific AutoCAD colors to the plotter pens does this. This allows specific line weights to be generated by the plotter and minimizes the need to use AutoCAD Polylines for all line work within a drawing.

Care should be taken to ensure that the selected color/line weight will produce the desired line width on the final drawing plot. The line type and color should provide the optimum contrast with the visible/object line width on the drawing. See Figure 4 for available plotter line widths.

3.3.2.7 New-Drawing Setup Files

New-drawing setup files, also identified in AutoCAD documentation as Prototype drawings, are pre-configured by means of this layering convention. (See Attachment B, Tables B-1 through B-9.)

The startup files are not all-inclusive of required layers. Additional layers may be created, as needed, to provide for specific drawing needs. The specified naming standard described here is to be used to develop additional layers.

Figure 4. Plotter Pen Assignments.

Pen No. 1 0.25mm (0010in.)	Pen No. 2 0.35mm (0.014in.)	Pen No. 3 0.5mm (0.020in.)	Pen No. 4 0.7mm (0.028in.)	Pen No. 5 0.95mm (0.038in.)
Color Assignment	Color Assignment	Color Assignment	Color Assignment	Color Assignment
Primary Color	Primary Colors	Primary Color	Primary Colors	Primary Color
8 (8)	5 (Blue) 6 (Magenta) 7 (White)	4 (Cyan)	2 (Yellow) 3 (Green)	1 (Red)
Optional Colors	Optional Colors	Optional Colors	Optional Colors	Optional Colors
X3 (e.g., 13, 53, 123, 243)	X2 (e.g., 12, 22, 32, 152, 222) 252-75% screen	X1 (e.g., 11, 71, 181, 241)	X0 (e.g., 10, 90, 100, 230) X5, X6, X7, X8, X9	X4 (e.g., 14, 64, 134, 214)

3.3.2.8 Layering Modification

Anyone may request additions or revisions to the Hanford Site discipline-layering standard. A request for changes must be submitted to Central Design Authority & Standards in writing. The request must provide justification and specific changes.

3.3.3 X-Reference Files

Prior to submitting files to the IRM Service Provider, X-Reference (see definition in Section 4.0) files must be bound to the AutoCAD ".DWG" drawing file.

3.3.4 Manual Modification or Revision of CAD-Generated Drawings

When a drawing is released, the CAD data set must reflect the released drawing. If a CAD-generated plotted drawing is changed (e.g., field of the drawing is changed) before it is issued, then the CAD data set must be updated to reflect the changes before issuing the drawing to the IRM contractor for release.

All manual changes are to be initialed and dated by the person making the changes. The engineer adds, signs, and dates a note stating that the manual changes to the drawing have been incorporated into the CAD data set. The note is placed above the Title Block on the drawing.

Engineering Change Notices incorporated into a released drawing that requires a manual change or alteration as a result of lost or corrupted CAD data sets, where the data set cannot be corrected, must have a note added to the drawing stating that the drawing is a manual drawing. Place the words "MANUAL DRAWING" above the title block in 1/2" high lettering. This signifies that the drawing has been manually updated and that the data set is not available for updating.

3.3.5 Third-Party CAD Software

Third-party software used in the development of AutoCAD-based drawings must be the type that does not require access to the third-party software to revise the drawings.

3.3.6 Shape Files and Non-Standard Fonts

Data sets of released engineering drawings are not to use nonstandard shape files and fonts (i.e., font files not supplied by AutoCAD) (see Section 3.19).

3.3.7 CAD Auxiliary Support Files/Information

Auxiliary support files/information is available on request from Central Design Authority & Standards. The available files and information include:

- Drawing start models (AutoCAD prototype drawings)
- Drawing Title Block formats
- Symbol libraries (see section 3.16) (e.g., architectural, electrical, control systems; heating, ventilation, and air conditioning [HVAC]; and P&ID).

3.4 Drawing Sizes

Drawings are sized in accordance with ASME Y14.1, "Decimal Inch Drawing Sheet Size and Format."

The ASME "F" size drawing (28" x 40") is the preferred inch size. Use of the International Standards Organization (ISO) standard paper sizes is optional. The ISO "A1" size drawing (594 mm x 841 mm) is the preferred metric size. The ANSI "E" size, ISO "A0" size, and roll or elongated size drawings may be used with the authorization of Central Design Authority & Standards.

3.5 Drawing Material

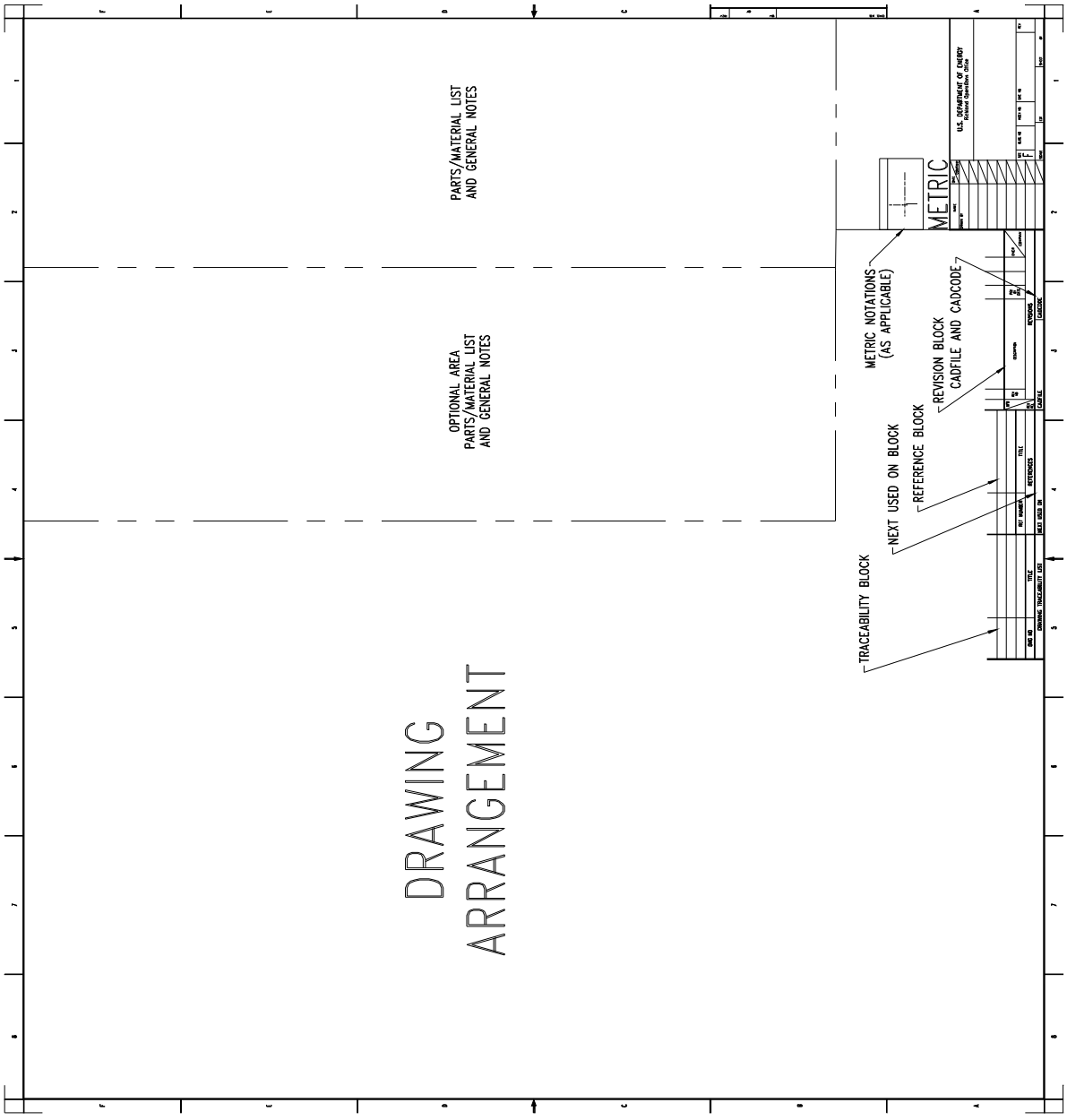
CAD drawings are plotted on bond paper that is a minimum of 20 lb. opaque paper.

3.6 Drawing Arrangement

The general drawing arrangement must conform to ASME Y14.1, except for the location of the parts/materials list and the REVISIONS Block (see Figure 5). Configure drawing arrangement as shown in Figure 5 and as defined in this standard.

Figure 5. Block Locations and Drawing Arrangement.

The CADFILE and CADCODE shown on older title blocks are no longer required and are to be left blank on new drawings that enter the drawing system for initial release. See also Section 3.25.4.3.



3.7 Title Block

Standard, discipline specific, AutoCAD start models developed for Hanford Site drawings must be used (e.g., AutoCAD prototype drawings). The start models are available from Central Design Authority & Standards. The "PLOT ID" information in the start model is added when the drawing is plotted as final from the Engineering Document Management System (EDMS) or, for work done offsite, is manually added by the TOC when the CAD dataset and approved drawing are submitted to Document Control.

3.7.1 Title Block Configuration

The Title Block must conform to ASME Y14.1, except as defined by this standard. Additional spaces in the Title Block have been reserved for unique items. A complete Title Block, as shown in Figure 6, is required for each drawing sheet (i.e., the second sheet drawing format per ANSI Y14.1 is not used).

Figure 6. Typical Title Block.

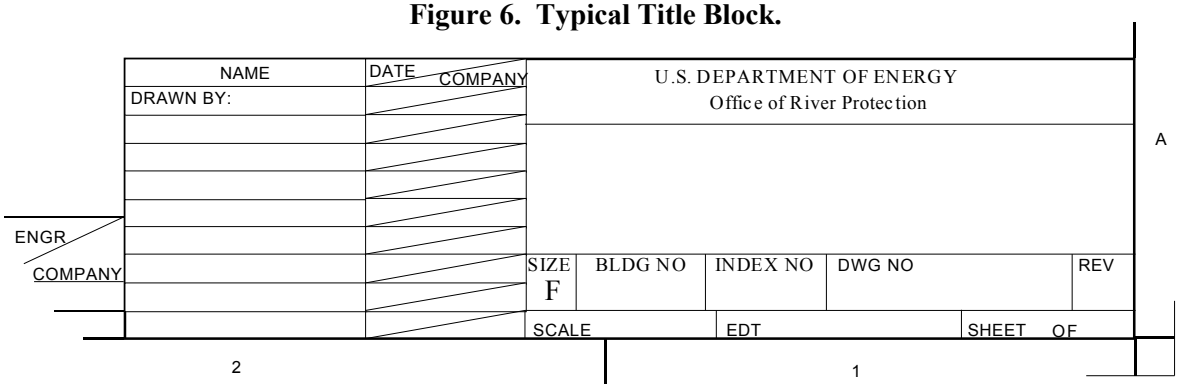
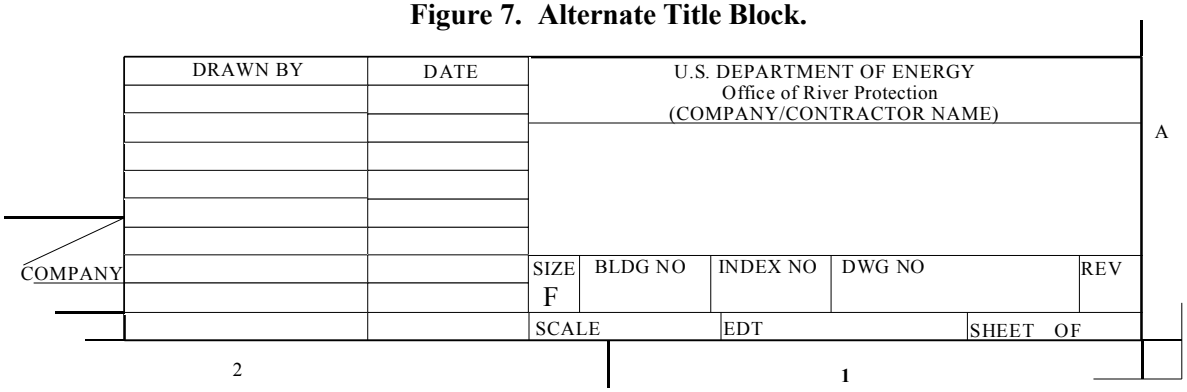


Figure 7 is an alternate Title Block configuration that may be used. The Title Block is to be in conformance with ASME Y14.1, except as defined by this standard. A complete Title Block is required for each drawing sheet;, i.e., the second sheet drawing format of ASME Y14.1 is not used.

Figure 7. Alternate Title Block.



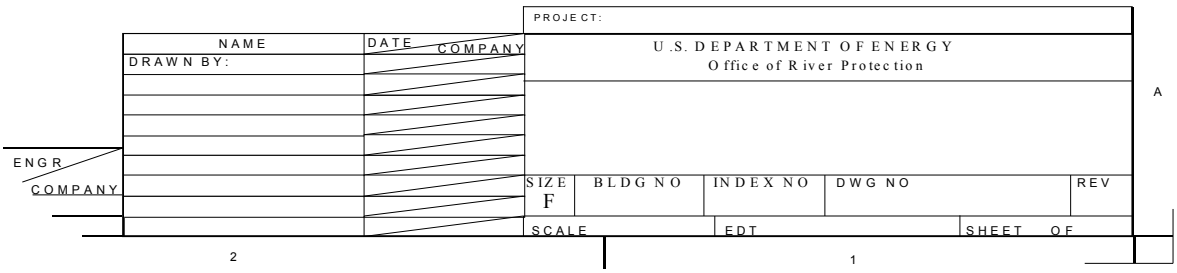
3.7.2 Company Name

The acronym of the contractor for each identified name is placed in the block next to the name and date (see Figure 6). For Architect Engineering (A-E) contract drawings, the name of the firm may be placed above the Title Block, except where the alternate title block shown in Figure 7 is used.

3.7.3 Drawing Title

- The title must clearly identify the subject matter.
- The title does not include capital project numbers or building numbers (e.g., W-120).
- The area number is used only for area-wide presentations.
- The total number of characters, including spaces, cannot exceed 60.
- Height of the lettering in the title must be a minimum of 0.24" for ISO A1 and ASME D and F size drawings. Minimum height of lettering 0.12" for all other drawings.
- Titles are arranged in one, two, or three lines centered in the block. All sheets of multiple-sheet drawings have the same title, except that the last line of the title may differ to describe the contents of each sheet.
- For capital projects, the project number and project title are entered in a supplemental block above the Title Block (see Figure 8).

Figure 8. Title Block with Supplemental Block for Project Identification.



3.7.4 Building Number

The building or area number is identified in the Title Block. If more than 12 buildings are depicted within the same area, the assigned building number becomes the area number followed by the letter G (e.g., 200G and 400G).

If additional space is required, the building numbers may be listed above the Title Block in the Drawing Status area of the drawing. A notation is then placed in the BLDG NO block referencing the drawing zone location of the list of building numbers (e.g., SEE ZONE A1; SEE ZN A1). Off-site A-Es obtain building numbers from the specified TOC project/task contact.

3.7.5 Index Number

The Drawing Index System uses numerical digits to categorize TOC drawings for storage and retrieval purposes. An index number is required on each drawing. The number is shown in the INDEX NO Block of each drawing.

Index numbers are listed in Attachment C, "Index Number System for Engineering Drawings, Alphabetic Listing" and Attachment D, "Index Number System for Engineering Drawings, Numeric Listing." An index number is assigned for each major category covered by the drawing. Non-essential numbers are not shown (e.g., 0801 and 0802 are not shown along with 0800 on a single drawing).

Off-site A-Es obtain index numbers from the designated TOC point of contact.

3.7.5.1 Index System

The complete index number comprises four or six numerical digits. The first two digits identify the primary subject (i.e., 00 to 99). The next two digits identify the sub-category or secondary information (i.e., 01 to 99). The last two digits cover a further breakdown, if needed, of the information or tertiary subject (i.e., 01 to 99). An index number will have a minimum of four digits (e.g., 0804, Architectural Equipment Locations), or if the subject requires a further breakdown, the index number may require six digits (e.g., 590315, Control Systems, Wiring Diagrams, Safety Circuits).

3.7.5.2 Primary Subjects

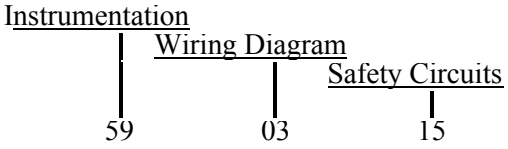
Index Number	Subject
00	- Listing or Index
01 through 07	- Civil
08 through 14	- Architectural and Structural
15 through 58	- Mechanical
59 through 64	- Instrumentation
65	- Electronics
70	- Flow Diagrams
71 through 81	- Electrical
82	- Insulation and Heat Tracing
83	- Future
84 through 88	- Piping
89	- Heating, Ventilating, and Exhaust
90	- Air Conditioning Systems
91 through 98	- Future
99	- Miscellaneous Equipment not Identifiable or Related to Assembled Equipment

3.7.5.3 Secondary Subjects

The primary subjects are divided further into details or secondary subjects (e.g., 0804, Architectural Equipment Locations, or 7005, Piping and Instrument Diagram Closed Loop System (CLS). The 04 and 05 digits are added to denote the details).

3.7.5.4 Tertiary Subjects

The tertiary subjects, containing two digits, are used only in conjunction with the primary subjects and secondary subjects, 49, 50, 59, 60, and 85, to indicate the type of drawing. The complete six-digit index number for a drawing showing a wiring diagram for safety circuits would be:



The number is written as 590315.

3.7.5.5 Multiple Index Numbers

In some instances a drawing may contain two or more index categories (e.g., Cranes [3900] and Electrical Power Plans [7301]). In this instance, place both index numbers in the Title Block. If additional space is required, the index numbers are listed above the Title Block in the Drawing Status area of the drawing. Place a notation in the INDEX NO block referencing the drawing zone location of the list of index numbers (e.g., SEE ZONE A1; SEE ZN 1A).

3.7.6 Drawing Number

The drawing number is 0.24” to 0.35” high. Obtain drawing numbers from HDNS. The Hanford site area that the drawing represents must be provided to obtain drawing numbers. Drawing numbers are assigned in accordance with the Hanford Site area that the drawing represents. The drawing prefix series and the representative areas are listed in Figure 9.

For historical drawing number information, see also Attachment A, “Guide for Historical Drawing Numbers.”

3.7.7 Revision Number

Numeric revision numbers are used. The current revision number is noted in the Title Block in the REV block (see Figures 6, 7, and 16). Zero is normally used for the initial release; also see Section 3.25.

3.7.8 Scale

Enter the predominant scale of the drawing, or “NONE” when no scale is used.

3.7.9 Sheet Number

For single sheet drawings, a “1” is entered in the SHEET block. For multiple-sheet drawings, the sheets are in sequence starting with 1. Enter the total number of sheets on sheet 1 only. Each subsequent sheet shows only the next sequential sheet number.

3.7.10 Drawn By

Print the initials and surname of the originator.

3.7.11 Approval Signatures

Approvals are in accordance with TFC-ENG-DESIGN-C-09. Preprinted or printed names with signatures placed next to or above the preprinted or printed names are required, and the signature must be legible.

Figure 9. Areas Represented by Drawing Prefixes.

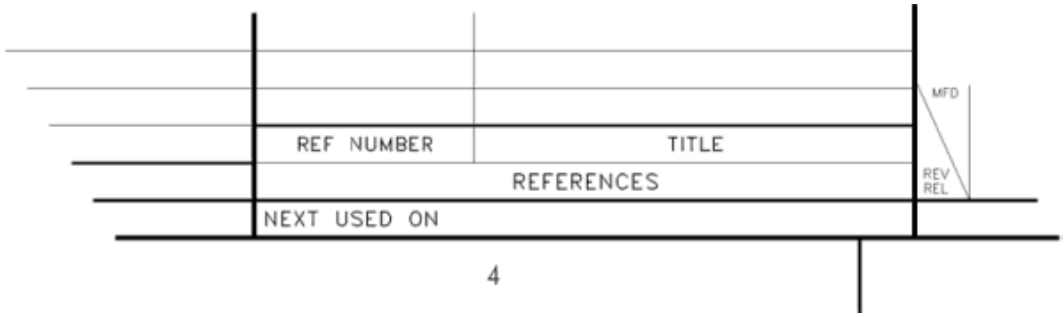
Drawing Prefix	Area
H-1	100 Area
H-2	200 Area
H-3	300 Area
H-4	400 Area; Fast Flux Test Facility (FFTF)
H-5	Unassigned except for electrical drawings not specifically applicable to other areas
H-6	General area, not included in other defined areas, usually civil drawings and maps
H-7	700 Area and City of Richland (RCHN, RCHC, and RCHS)
H-8	800 Area, Exploratory Shaft Site
H-9	Specification Control Drawings
H-10	Not Used
H-11	1100 Area
H-12	3000 Area
H-13	General mapping of the Hanford Site; Environmental Permitting
H-14	Waste Tank Farm (200 East, 200 West, transfer lines, and associated electrical and instrumentation)

3.8 References Block

3.8.1 Construction or Detailed Design

Only the reference documents required by the construction contractors are listed (see Figure 10). New drawings depicting new construction or detailed design are not required to be listed in the REFERENCES block, but are shown on the drawing. List the Vendor Information File number of supplied/existing equipment as a reference. National consensus standards are not listed in the REFERENCES block.

Figure 10. Typical Reference Block.



3.8.2 Reference Document Number and Title

The reference document number is entered in the REF NUMBER block (see Figure 10). The actual title is entered in the TITLE block and may be abbreviated.

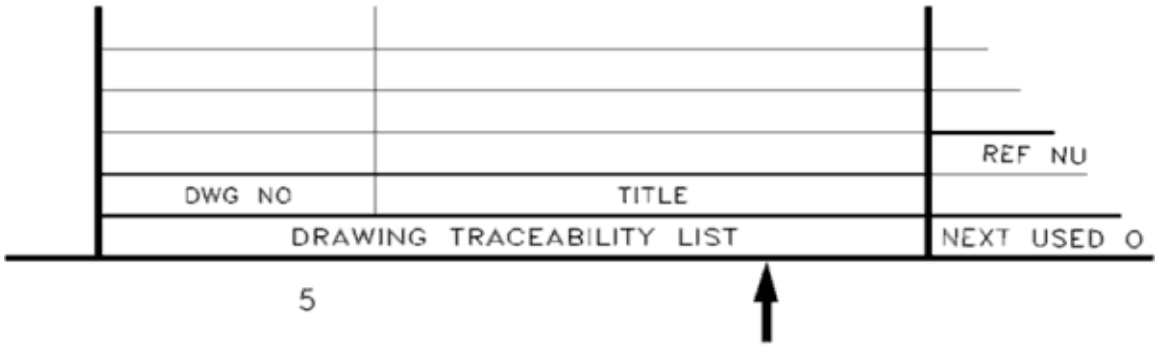
3.9 Next Used On Documentation

The NEXT USED ON block (see Figure 10) is used to document drawings that are linked together (e.g., a subassembly, detail and installation drawings). Link these drawings by referencing the next higher level or generation (e.g., a subassembly drawing will list the drawing number of the assembly or the installation drawing). If the drawing is the top drawing, the words "END ITEM" are entered.

3.10 Drawing Traceability List

The DRAWING TRACEABILITY LIST block itemizes the existing drawings affected by changes in design (see Figure 11). Show all affected drawings. The drawings are not to be duplicated in the REFERENCES block. All drawings are required to provide two-way traceability. Two-way traceability is cross-referencing existing engineering drawings affected by a new design or modification and vice versa.

Figure 11. Drawing Traceability List.



3.11 General Notes

The preferred location of the general notes is above the Title Block. Other locations may be used when additional space is required. On multiple-sheet drawings, General Notes start on sheet 1 and may continue on subsequent sheets.

3.12 Drawing Status Area

Reserve a space approximately 3" high above the Title Block on the drawing for recording additional Title Block information and for the application of A-E stamps according to individual contractor procedures.

3.13 Parts/Material List

The Parts/Material List is located, or begins, in the upper right-hand corner on the first sheet of the drawing. For additional parts/material list requirements, see section 3.22.

3.14 General Practice

Drafting is done according to applicable ASME Y14-series standards. Dimensioning and tolerancing is done according to ASME Y14.5M.

3.15 Abbreviations and Acronyms

3.15.1 Abbreviations

Abbreviations should conform to the latest edition of ASME Y14.38, "Abbreviations and Acronyms." Abbreviations on a drawing are used only when space does not permit the word(s) to be spelled out, such as in the drawing title, parts list, or a reference drawing list. Industry-accepted abbreviations, such as DIA, SCH, and REF are to be used to the fullest extent. The face of the drawing should be planned and drafted to provide ample space so that abbreviations can be held to a minimum, for clarity and interpretation.

Punctuation marks, except the slant (/) and the hyphen (-), are not to be used when abbreviations are used on drawings. A period (.) is added to an abbreviation only if in its context does not obviously represent an abbreviation (e.g., ADD indicates addition or addendum). Duplicate abbreviations are specified in the latest edition of ASME Y14.38. Before such abbreviations are used, care should be exercised to ensure that the proper meaning will be correctly interpreted.

3.15.2 Acronyms

Acronyms should conform to the latest edition of ASME Y14.38. Other acronyms should be avoided. However, if repeated use of a word in text (e.g., General Notes) makes the use of an acronym an obvious advantage, the acronym may be created. Hanford site-specific acronyms should be clearly defined by spelling out the acronym in the LEGEND or by using a general note. Hanford-specific acronyms are available at: http://www.hanford.gov/acronym/.

3.16 Symbology

Symbology used on drawings that defines components needs to be traceable to an engineering drawing (see section 3.16.1) or a LEGEND placed on the drawing. If additional symbology is required, which is not covered by the mandatory symbology listed below, industry accepted

standards will be used to the fullest extent possible with the symbology placed in a LEGEND on the drawing.

For additions or modifications of Hanford symbology, see section 3.16.3.

3.16.1 Mandatory Symbology

The uniform drawing symbology for the TOC is specified on H-14-020000, sheet 4.

3.16.2 Optional Symbology

The symbology specified by the following drawings is optional. It is provided as a drafting aid to increase efficiency in producing drawings. The symbology shown is preferred, but not mandatory.

- H-6-14982 Hanford Standard, General Symbology
- H-6-14983 Hanford Standard, Civil Symbology
- H-6-14984 Hanford Standard, Structural Symbology
- H-6-14985 Hanford Standard, Architectural Symbology
- H-6-14986 Hanford Standard, Machine Symbology.

3.16.3 Creation or Modification of Symbology Drawings

Additions or changes to the drawing symbols contained on drawing H-14-020000 are made in accordance with the ECN process.

3.16.3.1 AutoCAD Symbol Naming Standards

All AutoCAD symbology uses the naming standards listed in Attachment E, “Symbology.”

3.17 Legibility

Drawings must be prepared so that prints are legible when reduced on microfilm and then re-enlarged. As an example, parallel lines have at least 0.06” spacing on the hard copy drawing to maintain distinction. The final released drawing must be capable of passing a fifth-generation copy test (see definition in Section 4.0).

3.18 Drawing List

A drawing list is placed on the first drawing in a project set of 20 or more drawings. The drawing list may be placed on a separate or title sheet. The list contains the following information:

- Drawing numbers
- Drawing index number
- Building numbers (if more than one building is involved in the project)
- Title of each drawing
- Vendor information (VI) lists
- Specifications.

For multiple-sheet drawings, the number of sheets may be shown without repeating the rest of the information (e.g., H-1-12345, SH 6), provided that all the information is identical. When listing a specification or vendor information, the Hanford retrieval number is also listed next to the title.

3.19 Lettering

For CAD-developed drawings, lettering must be all upper case Gothic as defined in ASME Y14.2M, "Line Conventions and Lettering." AutoCAD supplied fonts ROMANS and ROMAND are considered to be in compliance with this requirement. Letter height will be a minimum of 0.12", except where lower case letters or metric symbols are standard (e.g., Na, mm, g). Lower case letters and symbols should be proportional. A minimum height of 0.1" is allowed in cases where smaller letter height is required, such as mapping. Also see Section 3.3.5.

3.20 Drawing Orientation

North should be oriented to the top or left side of the sheet. Exceptions are allowed where modifications are being made to existing facilities for which the orientation of the existing drawings is different or where industry practices dictate (e.g., civil drawings showing plan view strips with corresponding profiles). All plans on a given set of drawings need to be oriented the same and match the existing plant drawing orientation. A north arrow is placed and properly oriented on all maps, plans, layouts, and other drawings depicting spatial orientation.

3.21 Coordinate System and Geodetic Elevation Data

For new construction, the coordinates and elevation are as follows:

- Coordinates - The Washington Coordinate System of 1983, south zone (1991) (WCS83S(1991))

- Elevation Data - The North American Vertical Datum of 1988 (NAVD88).

3.22 Parts/Material List

A parts/material list is used on fabrication and assembly drawings, but not on project construction drawings as depicted on Figure 12 (see also Attachment F).

3.22.1 Arrangement and Size

The minimum width of the Parts/Material List block having one quantity column is 9.5" (see Figure 13). Quantity columns may be added as necessary. The parts/material list is located, or begins, in the upper right-hand corner on the first sheet of the drawing.

3.22.2 Contents

The parts/material list contains all material and separable components on the drawing. The individual pieces of weldments or other inseparable assemblies normally are not numbered separately.

3.22.3 Part Arrangement/Order

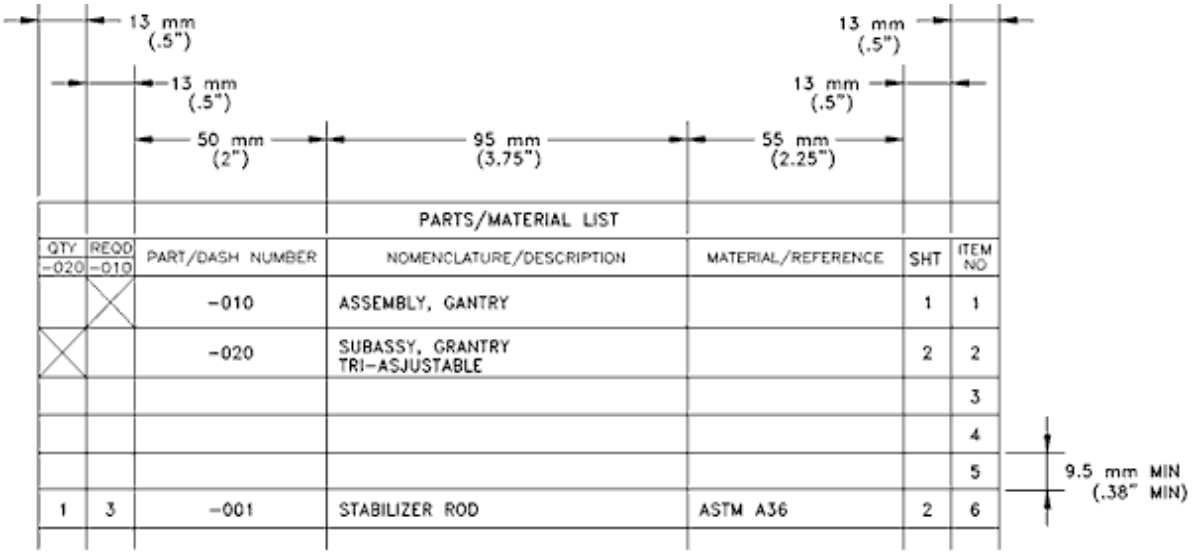
The parts/material list should be arranged in a hierarchy (i.e., assemblies, subassemblies, detail parts, catalog items). It is not necessary to rearrange the parts/material list merely to add a later entry.

Figure 12. Drawing Types and Classifications.

Engineering Drawing Type	Parts/Material List Not Used	Formal Parts/Material List, Required (See Code Key Below)	Material Call-out on Field of Drawing (See Code Key Below)
Architectural			All
Civil			All
Structural		1	2
Electrical		1-2-4	7
Piping		1-3-5	2
Instrumentation		1-2-3-4	7
Heating, Ventilation, and Air Conditioning		1-3-8	2-7
Mechanical		1	2
DRAWING CLASSIFICATION			
Fabrication		All	
Construction		6	All
Altered Item		1	2
Specification Control			All
Non-Fabrication/Construction, i.e., maps, conceptual layouts, cell arrangements, diagrams, schematics, wire run list, drawings made for operational use.	All		

1. Fabrication or shop-oriented drawings.
2. Construction field-installation-oriented drawings.
3. In parts/material list description column, enter all pipe ells, tees, etc., as "size of pipe and miscellaneous fittings."
4. In parts/material list description column, enter all conduit lugs, pull boxes, etc., as required by National Electrical Code.
5. Prefabricated.
6. Electrical, instrumentation, and HVAC disciplines (non-project).
7. Project construction type drawings only.
8. Process hood systems (supply and exhaust) and process exhaust systems drawings only.

Figure 13. Parts/Materials List Placement.



PARTS/MATERIAL LIST

QTY REQD -020	QTY REQD -010	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHT	ITEM NO
	X	-010	ASSEMBLY, GANTRY		1	1
X		-020	SUBASSY, GRANTRY TRI-ASJUSTABLE		2	2
						3
						4
						5
1	3	-001	STABILIZER ROD	ASTM A36	2	6

3.22.4 Part Number

Unique part numbers are assigned where a design configuration (i.e., assembly, subassembly, and detail) is controlled on an H-series drawing. A part number is used to uniquely identify a specific item. Items that are not interchangeable are identified with separate and unique part numbers.

The official part number is the drawing number and the assigned dash number (see Section 4.0). When a part number is referenced, both the drawing number and the dash number are identified.

3.22.5 Parts and Assembly Numbers

Each assembly, subassembly, and detailed part is assigned a separate and unique part (dash) number. The primary assembly is assigned the -010 dash number. Additional assemblies and subassemblies are assigned every tenth number consecutively (e.g., -020, -030, -040, etc). The first detailed part is assigned the -001 dash number. Additional detailed parts are assigned -002, -003, -004, etc., with every tenth digit reserved for assemblies.

3.22.6 Interchangeable Parts

Interchangeable parts are equivalent in performance and durability. They are capable of being exchanged one for the other without alteration of the item or of adjoining items, except for nominal adjustment. They are also interchangeable in terms of fit and performance. Interchangeability is also explained in general notes with a statement in the parts/material list to see the applicable general note.

3.22.7 Part Number Revisions

The parts/materials list periodically requires revisions and/or material deletions due to fabrication changes or modifications to the original design. The following are accepted methods for changing the parts/material list, when accompanied by an Engineering Change Notice (ECN):

- Remove a part or material item by placing a double line through the part or material item (e.g., CAD or manual drawings).
- Remove a part or material item and add the word "Deleted" in place of the part or material item (e.g., CAD revision).

3.22.8 New Part Number

New part numbers, including applicable altered item part numbers (see section 3.22.10), are assigned when the design of a part, fabricated assembly, or procured item is changed so that any of the following conditions could result:

- Performance or durability is affected to the extent that superseded items must be discarded for reasons of safety, failure, or malfunction.
- Parts, assemblies, or subassemblies are changed so that the new designs are not directly and completely interchangeable with respect to installation and/or specified performance.
- When replaced/redesigned parts are limited to use in specific applications and the newly designed items are not so limited.
- When an existing Hanford item, or vendors' purchased item, requires alteration.
- When existing items cannot be reworked to be directly and completely interchangeable with the new design.

NOTE: New materials are added at the end of the parts/materials list using sequential part numbers. Part numbers cannot be reused for new or different parts/material; new part numbers are required.

3.22.9 Purchased Items

Purchased items are identified in the parts/materials list with the manufacturer's part number or vendor information (VI) number. These items are normally controlled by the vendor, by industrial or government codes, standards, or file number.

3.22.10 Altered Item

If the design of a vendor-supplied item is altered after purchase for an existing Hanford Site application (documentation may be contained in a VI file), or for use in a new engineering design, the following requirements apply:

- "ALTERED FROM (manufacturer's part number and part name or existing Hanford part number and part name)" is recorded in the description column of the parts list.
- Assign a new Hanford part number and place it in the part number column.

- The alteration is detailed by visible lines in accordance with ASME Y14.2M. Reference features (features not requiring alteration) are limited to orientation for describing where designated alterations are required. Reference features are shown by phantom lines in accordance with ASME Y14.2M.

3.22.11 Quantities and Customary Trade Units

Quantities are counted accurately and shown in customary trade units.

3.22.12 As Required (AR) Designation

The letters AR (as required) are used where the quantity is not known or where the quantity could vary.

3.22.13 Part Description

The part description should be generic, except where a specific item is required, and the design depends on or is tailored to the specific item. The name of the item is listed first with supplemental descriptive words following. The description of an item must be complete and provide specifications sufficient to procure the item.

Standard industry language is used to define the item. If the item can be completely described in the parts/materials list, it need not be delineated on the drawing. If description/specification is lengthy, it may be in the general notes or in a separate specification. If the description/ specification is placed in the general notes or in a separate specification, the general note or separate specification is referenced in the description column of the parts list.

3.23 Component Numbering

Structures, systems, and components are numbered in accordance with standard RPP-8530 and TFC-OPS-OPER-C-32.

Coordinate assignment of component numbers with Base Operations Engineering to avoid duplication of component numbers.

3.24 Measurement System

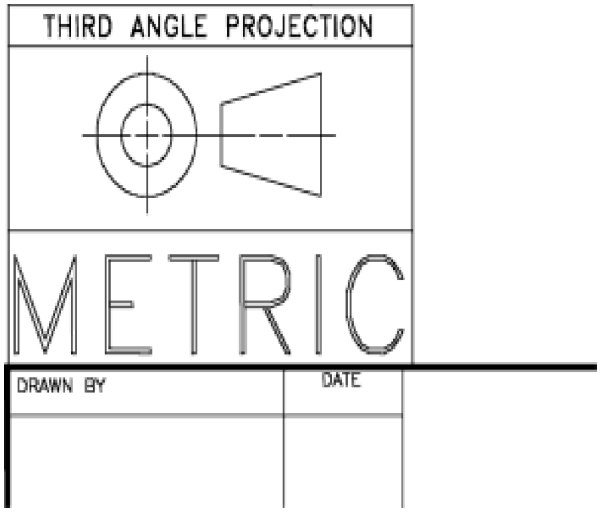
3.24.1 General

English customary units (inch pound system) are used for measurements shown on drawings, unless otherwise directed by the TOC Chief Engineer. Alternate units, such as metric (SI) equivalents, are not required to be shown. Modifications to drawings that contain English customary units use those units unless otherwise directed.

3.24.2 Metric Notation

If drawings are directed to be done in the metric (SI) system, the word "METRIC" (see Figure 14 and Figure 5) is placed directly above the Title Block in 6 mm bold gothic lettering as defined by ASME Y14.2M.

Figure 14. International Projection Symbol.



3.24.3 Third Angle Projection

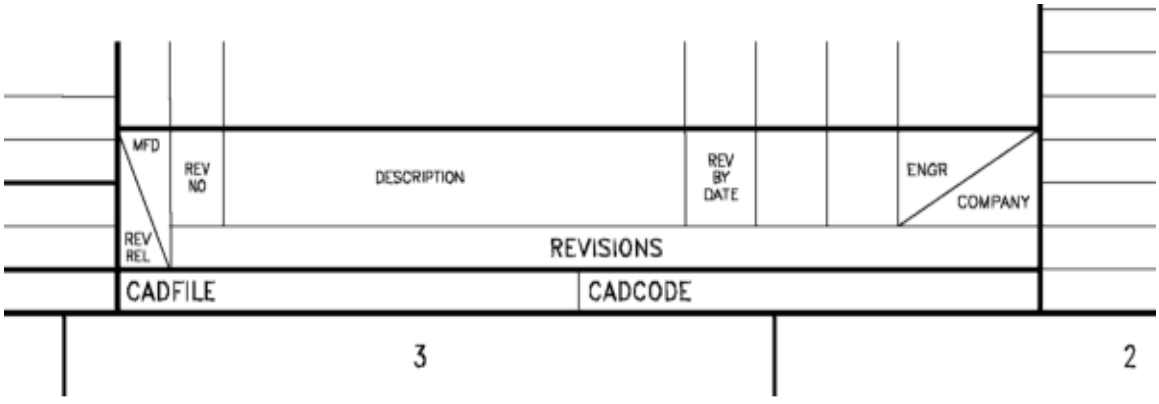
All drawings developed using the multi-view system of orthographic presentation as specified in ASME Y14.3M, "Multi and Sectional View Drawings," are to use the third angle projection method.

3.25 Revisions

3.25.1 Revisions Block Size and Location

The REVISIONS block are sized according to ASME Y14.1, and configured as shown in Figure 15. Location of the block is according to the drawing arrangement format (see Figure 15).

Figure 15. Typical Revision Block.



3.25.2 Description

The authorizing engineering change document is entered in the revision description (e.g., Engineering Change Notice (ECN)). Conservation of space is essential; therefore, ANSI abbreviations are used while keeping the meaning clear.

3.25.3 Revision Numbers

When revising multiple-sheet drawings, each sheet is considered a separate drawing. Revision numbers are advanced only on the sheet or sheets being affected by the change.

3.25.4 Change Incorporation - For Drawings that are Maintained in the Hanford Drawing System

Show the authorizing ECN number in the REVISIONS Block (e.g., REVISED PER ECN (number)).

3.25.4.1 Incorporation of Engineering Change Notices

During ECN incorporation, an additional ECN is not required for the following non-technical changes:

- When adding an additional sheet(s) to an affected drawing as a result of the incorporation of an ECN. Under these circumstances the original ECN being incorporated is the authorizing ECN document.
- Correcting misspelled words.
- Adding or revising related/referenced arrangements, views, sections, details, and/or tables to accurately delineate the approved ECN incorporation on an affected drawing.
- Delineating the ECN incorporation on a subsequent sheet(s) of an affected drawing when there is insufficient space available for depicting the required information.
- A statement describing variances from the authorizing ECN is added in the revision description block to document the changes. Examples are as follows:
  - Incorporated ECN XXXXXX, was sheet 3 of 4
  - Incorporated ECN XXXXXX, moved detail X
  - Incorporated ECN XXXXXX, added detail X due to insufficient space on sheet X
  - Incorporated ECN XXXXXX, added new sheet X.
- Conversion of a manual drawing to a new CAD.DWG file.
- Removing impact levels.

3.25.4.2 Revision Numbering and Release

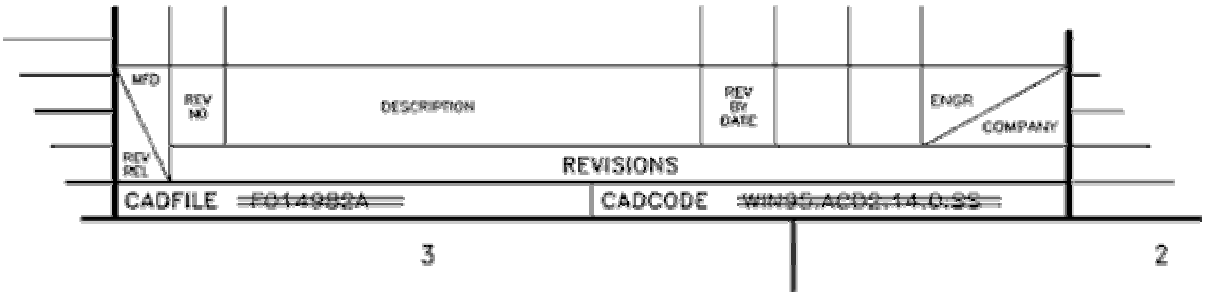
List each new revision in numerical sequence. Only released (issued) drawings are revised. Each subsequent revision is released before another revision is made. The latest revision number is shown in the Title Block (see Section 3.7.7 and Figure 15).

3.25.4.3 CAD-Revised Drawings

CAD-developed drawings do not require approval signatures from previous revisions to be printed in the spaces of the Title or REVISIONS Block. Reference to see the applicable revision is placed in the approval block (e.g., see Revision 0 or see Revision 5).

On drawings that have a CADFILE and CADCODE the data is to be removed or a strikeout through the text. See Figure 16.

Figure 16. CADCODE and CADFILE Strikeout.



3.25.4.4 Removing Revisions

Drawings in the Hanford system that have been previously approved and microfilmed may have revisions removed from the drawing(s) on subsequent revisions.

3.25.4.5 Revision Documentation and Approval

The responsible engineer signs and enters the company acronym in the ENGR/COMPANY block of the revision block, see Figure 15. Drawing revision requirements and results are documented and approved by an ECN prior to the release of a drawing that has been revised.

3.25.4.6 Change After Approval

Changes made to drawings after approval and before formal release and microfilming require complete re-approval of the drawings. All existing approval signatures and dates are removed and new approval signatures are obtained.

3.25.4.7 Adding Additional Sheets

Additional sheet(s) that are added are released as revision "0." The ECN number being incorporated is placed in the block identified for the Engineering Data Transmittal (EDT). The letters EDT are removed or marked out and the number placed in this block (e.g., ECN number).

3.26 Official Use Only and Export Controlled Drawings

The originating organization marks the drawing in accordance with TFC-BSM-IRM_SE-C-05 to reflect OUO or ECI markings or other required controls as needed; contacts Subject Mater Experts, Derivatives Classifiers, or Legal Services as required to establish accountability; and protects the document using security and handling requirements apropriate for the level marked on the drawings.

3.27 Superseded Drawings, Voided Drawings, and Title Block Changes

When drawings are superseded or voided, or when a building, index, or drawing number is changed, the affected drawings are revised with an ECN.

3.27.1 Superseding a Drawing with a Different Drawing Number

3.27.1.1 The Superseded Drawing

A note stating, "SUPERSEDED BY DWG (number) REV.(number)," is placed near the Title Block in 0.24" high lettering.

3.27.1.2 The New Drawing

A note stating, "SUPERSEDES DWG (number) REV. (number)," is placed near the Title Block in 0.24" high lettering.

3.27.2 Superseding an Approved Drawing with a Drawing of the Same Drawing Number (Redraw)

The conversion of a manual drawing to an AutoCAD file does not require the use of an ECN. For these drawing conversions, the drawing revision number shall be incremented, and the revision description on the drawing sheet shall include the following description: "Manual to AutoCAD conversion". (Revision of a CAD.DWG file is not a redraw. Development of a new CAD .DWG file from an existing released drawing is a redraw.)

3.27.3 Voided Drawings

Place the word "VOID" near the Title Block in 0.5" high lettering. The revision of the drawing is advanced with the authorizing ECN number identified in the REVISIONS Block (e.g., VOID PER ECN number). The use of a microfilm copy of the affected drawing may be used in place of the original drawing for this voiding process.

3.27.4 Changing Drawing Numbers, Index Numbers, or Building Numbers

3.27.4.1 Changing Index Numbers

Add or delete additional Index Numbers by revision of the drawing.

3.27.4.2 Changing Building Numbers

Add or delete Building Numbers by revision of the drawing.

3.28 Changing the Title of a Drawing

Changes in the title of an approved drawing require a revision. All current requirements apply to revised drawing titles (see Section 3.7.3).

3.29 Interface Control

Interface control is the establishment and preservation of design features between co-functioning systems or components shared typically by two or more contractors or projects. This design interface information is identified on the appropriate engineering drawing(s) by an interface control symbol. The interface control symbol (defined on drawing H-14-020000, sheet 4) is used to recognize and maintain the compatibility of the design features at these interface boundaries that require control. This symbol provides the physical location for the design features (e.g., electrical terminations, power requirements, size and locations of connection points, flow rates) that are subject to control.

Two methods are available to depict the interface control boundary and their associated design features. The first and preferred method is to display the interface control symbol at the appropriate drawing location. The symbol includes a reference to the unique and retrievable number of the authorizing interface control document (ICD); e.g., ICD 01. This referenced ICD provides the detailed information on the design features for this controlled interface.

The second method should only be used when an authorizing ICD does not exist, or when the controlled interface contains minimum (three or less) design features. When using the second method, the responsible organization (owner) is also identified either at the location of the interface control symbol or in the General Notes section of the drawing. For a complex interface that exceeds these maximum three design features, an ICD is created.

Add an interface control note to the General Notes section of the affected drawing (applies to either method used) to identify that the information on this drawing contains controlled interface design features. This general note should read as follows:

"Interface control information impacted on this drawing requires change approval."

4.0 DEFINITIONS

Altered-tem drawing. An engineering drawing used to control and depict the alterations to a commercial item. An altered-item drawing reflects only the change and is not intended to show complete fabrication details.

Applied material. Material that is not normally shown on the graphic presentation of a drawing (e.g., glues, adhesive, paint, cleaner). It may or may not have a manufacturer's identification number. Applied material normally is identified in the General Notes and its application explained, as required. Weld rod is excluded from this definition.

Arrangement/Installation drawing. The top level drawing where multiple related details, assemblies, subassemblies, and certain connecting parts and/or instructions are shown depicting the final arrangement.

As required (AR). A notation used when an exact quantity is not known or cannot be easily predetermined. The notation is placed in the "Quantity Required" column of the parts list.

Assembly. A term used to describe parts and/or subassemblies joined to complete a designed relationship.

NOTE: In view of the difficulty, in some cases, in establishing a clear distinction between the terms "assemblies" and "sub-assemblies," these two terms may be considered to have the same meaning and may be used interchangeably.

Brand name. Brand name implies the manufacturer, model, catalog name/number, trademark, or identifying name other than generic.

Computer-Aided Design (CAD) Data Set. The CAD data set is the computer data file used to produce a hard copy engineering drawing.

Dash number. A dash number is a unique numerical identification assigned to an item whose design is controlled by the drawing. When suffixed to the drawing number, the dash number provides a unique part number (see Part Number definition) for that item. A dash number is assigned where two or more items or an assembly are depicted on a drawing. The dash number will consist of three digits and be assigned as follows:

1. Assemblies. Every tenth number is reserved for assemblies (e.g., -010, -020, -030, -040).
2. Parts. -001 for the first part and consecutively for all others, reserving every tenth number for assemblies (e.g., -001 through 009; -011 through -019; etc.).

Detailed (piece parts) item. An individual item or units of material that requires specific part (dash) number identification because of traceability and accountability requirements for that item.

Fifth-generation copy test. For the purposes of this standard, a fifth-generation copy test consists of making a full size copy (first-generation copy) from the original document, using a high quality copier. Then making a copy of the copy (second-generation); then a copy of that copy (third-generation copy), etc., until the fifth-generation copy is achieved. The graphics and text of the fifth-generation copy must be clearly legible without magnification, special lenses, or editing.

Hardware item. Fasteners that may or may not require material identification (e.g., ASTM, and SAE).

Inch/Pound measurement. Inch/pound measurements are units of the English measurement system (e.g., inches, pounds, degrees Fahrenheit, gallons). The formally recognized inch/pound units are the foot and the pound as defined by the National Institute of Standards and Technology (NIST).

Inseparable assembly. Parts/material joined in such a manner that they are incapable of being disassembled without destroying the intended function of the item (e.g., weldments, bonded assembly).

Item number. A number assigned to every line entry of a Parts/Materials Lists to tabulate items in the list. It is also used to locate an item in the field of the drawing and is not used for unique identification purposes.

Material item. Material used in an inseparable assembly whose final configuration is contained within the configuration of that assembly (e.g., a weldment). Also, see Inseparable Assembly definition.

Part number. A part number consists of letters, numbers, or combinations of letters and numbers, that may or may not be separated by dashes and are assigned to uniquely identify a specific item. Part Numbers assigned to Hanford "H" series drawings consist of the drawing number plus a dash number.

EXAMPLE: H-3-60670-010
-010 is the Dash Number
H-3-60670 is the Drawing Number

Parts/Materials list. A tabulation of parts and/or material required for constructing, fabricating, or procuring the items depicted on a drawing.

Subassembly. An assembled unit designed to be incorporated with other units (see Assembly definition).

X-Reference. This is an AutoCAD program feature that allows drawing data to be shared between data files. The shared data is not permanently part of the drawing until the X-Reference data is bound into the master (main) data file.

5.0 SOURCES

5.1 Requirements

1. Contract number DE-AC27-08RV14800.
2. DOE O 252.1, "Technical Standards Program."
3. TFC-PLN-02, "Quality Assurance Program Description."
4. TFC-PLN-03, "Engineering Program Management Plan," Section 5.0, Table 1.

5.2 References

1. ANSI Y14.38 (latest edition), "Abbreviations and Acronyms."
2. ANSI Y14.1 (latest edition), "Decimal Inch Drawing Sheet Size and Format."
3. ANSI Y14.5M (latest edition), "Dimensioning and Tolerancing."
4. ASME Y14.2M (latest edition), "Line Conventions and Lettering."
5. ASME Y14.3M (latest edition), "Multi and Sectional View Drawings."
6. TFC-BSM-IRM_SE-C-05, "Marking Sensitive Unclassified Information."
7. TFC-ENG-DESIGN-C-06, "Engineering Change Control."
8. TFC-ENG-DESIGN-C-09, "Engineering Drawings."
9. TFC-ENG-DESIGN-C-21, "Vendor Information."
10. TFC-BSM-IRM-STD-06, "Records Management Standard."

ATTACHMENT A – GUIDE TO HISTORICAL DRAWING NUMBERS

The Hanford drawing system has a legacy of drawings that do not conform to current practices. This guide will assist in interpreting the drawing numbering system from the early days of Hanford and from irregularities in the drawing tracking system

A. The following designations are a legacy of Hanford's early days.

- AEC - Used for 700 and 1100 Areas (Atomic Energy Commission drawing file)
- SP and P - Used for 100 H and 100 C Areas
- M-Series - Used for Hanford area maps
- D and W - Used for original DuPont drawings (W = Arrangements/Profiles; D = Details)
- SK-Series - Assigned to temporary drawings for off-site procurement, experimental equipment, limited-use test equipment and conceptual designs.

The 400 Area, FFTF facility, has a number of Architectural-Engineering (A-E) drawings that have various drawing number assignments. These drawings are maintained as a special case in the Hanford drawing system. Some examples of the drawing numbers are: 00369, 30703726-000, 375, 6083-01-301, 671C499, 6MD13007-2D1, A888-6001, AA-4698, P-C418, SKT-241, T73065-300, W-22027-17-20, W-26007, S-06-07-1.

NOTE: Drawing prefixes AEC, SP, P, M, D, W, and SK are record drawings only; all new drawings use an "H" prefix.

B. Drawing number irregularities include the following:

- Certain 202-A building drawing numbers (200 Area) -

  Example: H-2-53505-M. Disregard the letter designator "M" in this example. These letters are to be removed as part of the next regular revision. New drawings calling out these drawings as a reference will omit the letter designator.

- Certain 222-S, 284-E, and 284-W building drawing numbers (200 Area) - Example: H-II-4428-10.

  The "H-II" was intended to be Roman numeral II, and may be confused with "H-11" (1100 Area drawings). The "-10" suffix is the sheet number. All references to these drawings on new drawings should be, for example, "H-II-4428 sheet 10." Revisions to these drawings do not require that the Roman numerals be changed to Arabic. New drawings developed for these buildings use "H-2" prefixes and conventional sheet identification.

- Certain "H-4" drawings and some early instrument drawings using "H-4" drawing numbers were used for site-wide applications.

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE

Table B-1. Startup Layer Naming Standard - General Layering For All Disciplines

Note: Selected layers from the general layering for all disciplines are added to the drawing setup models as necessary to define and separate drawing data.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
	AUTOCAD PROGRAM			
0	AutoCAD generated. Not for project drawings; used for standard symbol creation	White	Continuous	Pen No. 2
DEFPOINTS	AutoCAD generated; associative dimensioning definition points automatically on this layer; used for display only, as AutoCAD will not print.	White	Continuous	Pen No. 2
GENERAL LAYERS				
?O-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
[2]?M-DIM	Dimensioning	253	Continuous	Pen No. 1
[2]?T-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
[2]?T-BTXT	Bold text	Yellow	Continuous	Pen No. 4
[2]?T-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
[2]?T-CHK	Checker's marks (informal only)	11	Continuous	Pen No. 3
[2]?O-VPT	Paper space Viewport border	White	Continuous	Pen No. 2
[2]?O-CLD	Clouded areas for Hold, ECN, and revision	White	Continuous	Pen No. 2
[2]?E-EXST	Anything existing to remain	8	Phantom	Pen No. 1
[2]?D-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
[2]?C-CLINE	Center line	Blue	Center	Pen No. 2
[2]?X-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
[2]?H-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
[2]?V-MLN	Matchlines	Red	Phantom	Pen No. 5

[1] The "?" is replaced with the correct Discipline Identifier; see Section 3.3.2.

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-2. Startup Layer Naming Standard - Architectural Drawings

Note: When additional layers are created to specify discipline information, other than architectural, the object/function identifier from the appropriate discipline table should be used to define the drawing data. The architectural discipline identifier should be used and the applicable plotter pen number assigned.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
AO-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
AM-DIM	Dimensioning	253	Continuous	Pen No. 1
AT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
AT-BTXT	Bold text	Yellow	Continuous	Pen No. 4
AT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
AO-VPT	Paper space Viewport border	White	Continuous	Pen No. 2
AO-CLD	Clouded areas for Hold, ECN, and revision	White	Continuous	Pen No. 2
AE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
AD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
AX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
AV-MLN	Matchlines	Red	Phantom	Pen No. 5
SPECIFIC LAYERS				
AO-ACCESSORY	Accessory items - including furniture, HVAC equipment, plumbing fixtures, people, trees, vehicles, etc.	White	Continuous	Pen No. 2
AO-CEILING	Ceiling - SATC, hanger wires, etc.	White	Continuous	Pen No. 2
AC-COLUMN	Building column lines	White	Center	Pen No. 2
AO-DOOR	Interior and exterior	Magenta	Continuous	Pen No. 2
AO-DOORSPEC	Door tag (Architectural Steering Group users only)	White	Continuous	Pen No. 2
AO-FLOOR	Floor plan and background	8	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-2 (cont.) Startup Layer Naming Standard - Architectural Drawings

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
SPECIFIC LAYERS (Continued)				
AO-HEADER	Door header (use with ceiling plan)	White	Continuous	Pen No. 2
AO-SCHEDULE	Room, door, finish, and window	Cyan	Continuous	Pen No. 3
AO-STAIR	Interior and exterior	White	Continuous	Pen No. 2
AO-TAG	Tags for miscellaneous equipment, windows, etc.	White	Continuous	Pen No. 2
AO-WALLS	Interior and exterior	Cyan	Continuous	Pen No. 3
AO-WINDOWS	Interior and exterior	White	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-3. Startup Layer Naming Standard - Civil/Structural/Environmental Drawings

Note: When civil and structural items exist in the same drawing, use both layer naming standards.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
?O-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
[3]?T-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
[3]?T-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
[3]?O-VPT	Paper space Viewport border	White	Continuous	Pen No. 2
[3]?V-MLN	Matchlines	Red	Phantom	Pen No. 5
Specified general layers are used in both the civil and structural drawings. The "?" is replaced with the correct discipline identifier; see Section 3.3.2.				
CIVIL DRAWING SPECIFIC LAYERS				
CO-GRID	Site Grids, Profile Grids, etc.	253	Continuous	Pen No. 1
CO-SITE	Property lines, boundaries, fences, etc.	60	Continuous	Pen No. 4
CO-ROAD	Roads, trails, parking, etc.	10	Continuous	Pen No. 4
CO-STRL	Structural work	210	Continuous	Pen No. 4
CO-GND	Contours, grade breaks, etc.	Green	Continuous	Pen No. 4
CO-EX-CONT	Existing contours	252	Continuous	Pen No. 2
CO-NEW-CONT	New contours	92	Continuous	Pen No. 2
CO-PIPE	Pipelines and piping	Yellow	Continuous	Pen No. 4
STRUCTURAL DRAWING SPECIFIC LAYERS				
SC-GRID	Building column grid	253	Center	Pen No. 1
SO-GND	Grade or earth shown on sections	Green	Continuous	Pen No. 4
SO-CONC	Concrete	Yellow	Continuous	Pen No. 4
SO-FRWK	Framework	Cyan	Continuous	Pen No. 3
SO-RBR	Rebar	130	Continuous	Pen No. 4
SO-MECH	Piping or other mechanical	11	Continuous	Pen No. 3
SO-EMBED	Embedments	131	Continuous	Pen No. 3
SO-STL	Steel	130	Continuous	Pen No. 4

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-4. Startup Layer Naming Standard - Electrical Drawings

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
EO-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
EM-DIM	Dimensioning	253	Continuous	Pen No. 1
ET-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
ET-BTXT	Bold text	Yellow	Continuous	Pen No. 4
LIGHTING/SITE DRAWING SPECIFIC LAYERS				
EE-BKG	Background	8	Phantom2	Pen No. 1
EO-BLD	Building	171	Continuous	Pen No. 3
EO-CND	Conduit, cable, raceway, boxes, ductbanks	51	Continuous	Pen No. 3
EO-CPT	Cathodic protection	11	Continuous	Pen No. 3
EO-EQP	Equipment	211	Continuous	Pen No. 3
EO-LTG	Lighting	Cyan	Continuous	Pen No. 3
EO-MS1	Electric miscellaneous 1	32	Continuous	Pen No. 2
EO-MS2	Electric miscellaneous 2	51	Continuous	Pen No. 3
EO-OHD	Overhead lines	11	Continuous	Pen No. 3
EO-RCP	Receptacles, (120, 208, 480V)	Cyan	Continuous	Pen No. 3
EO-SGD	Signaling devices	211	Continuous	Pen No. 3
EO-UGD	Underground lines (hidden)	13	Hidden	Pen No. 1
DIAGRAM/SCHEDULE DRAWING SPECIFIC LAYERS				
EO-DIA	Diagrams, one-line, elementary, etc.	91	Continuous	Pen No. 3
EO-MS1	Electric miscellaneous 1	32	Continuous	Pen No. 2
EO-MS2	Electric miscellaneous 2	51	Continuous	Pen No. 3

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-5. Startup Layer Naming Standard - Fire Protection Drawings

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
FO-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
FM-DIM	Dimensioning	253	Continuous	Pen No. 1
FT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
FT-BTXT	Bold text	Yellow	Continuous	Pen No. 4
FE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
FD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
[6]FC-CLINE	Center line	Blue	Center	Pen No. 2
FV-MLN	Matchlines	Red	Phantom	Pen No. 5
FIRE DETECTION DRAWING SPECIFIC LAYERS				
FO-AD	Alarm and detection system	211	Continuous	Pen No. 3
FO-FW	Fire water underground	211	Hidden	Pen No. 3
SPRINKLER DRAWING SPECIFIC LAYERS				
FO-FW	Fire water underground	211	Hidden	Pen No. 3
FO-SS	Sprinkler system	211	Continuous	Pen No. 3
FO-HS-1	Standpipe hose system	211	Continuous	Pen No. 3

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-6. Startup Layer Naming Standard - HVAC Drawings

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
HO-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
HM-DIM	Dimensioning	253	Continuous	Pen No. 1
HT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
HT-BTXT	Bold text	Yellow	Continuous	Pen No. 4
HT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
[8]HO-VPT	Paper space Viewport border	White	Continuous	Pen No. 2
HV-MLN	Matchlines	Red	Phantom	Pen No. 5
HVAC DRAWING SPECIFIC LAYERS				
HO-EQP	HVAC or piping equipment	51	Continuous	Pen No. 3
HO-EXH	HVAC exhaust system	171	Continuous	Pen No. 3
HO-PIP	Piping and piping fixtures and hardware	51	Continuous	Pen No. 3
HO-PLM	Plumbing and plumbing fixtures and hardware	201	Continuous	Pen No. 3
HO-RTN	HVAC return system	Cyan	Continuous	Pen No. 3
HO-SUP	HVAC supply system	51	Continuous	Pen No. 3
HVAC/INSTRUMENTATION DRAWING SPECIFIC LAYERS				
IO-ELEC	Electrical equipment	71	Continuous	Pen No. 3
IO-DCS	Distributed control system instruments	Cyan	Continuous	Pen No. 3
IO-ELINE	Electrical signal lines	42	Hidden	Pen No. 2
IO-ILINE	Instrument lines, such as pneumatic	Magenta	Continuous	Pen No. 2
IO-CVAL	Control valves	Cyan	Continuous	Pen No. 3
IO-SLINE	Software link line	Magenta	Continuous	Pen No. 3

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-7. Startup Layer Naming Standard - Instrumentation & Control (I&C) Drawings

Note: When creating additional layers to specify existing and future layers, the preferred color is 8, which is designated to Plotter Pen No. 1.

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
IO-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
IM-DIM	Dimensioning	253	Continuous	Pen No. 1
IT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
IT-BTXT	Bold text	Yellow	Continuous	Pen No. 4
IT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
IT-CHK	Checker's marks (informal only)	11	Continuous	Pen No. 3
IO-VPT	Paper space Viewport border	White	Continuous	Pen No. 2
IO-CLD	Clouded areas for Hold, ECN, and revision	White	Continuous	Pen No. 2
IE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
ID-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
IC-CLINE	Center line	Blue	Center	Pen No. 2
IX-HATCH	Cross section lines	Blue	Continuous	Pen No. 2
IH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
IV-MLN	Matchlines	Red	Phantom	Pen No. 5
P&ID DRAWING SPECIFIC LAYERS				
IO-ELEC	Electrical equipment	71	Continuous	Pen No. 3
IO-INS	Instruments	211	Continuous	Pen No. 3
IO-DCS	Distributed control system instruments	Cyan	Continuous	Pen No. 3
IO-ELINE	Electrical signal lines	42	Hidden	Pen No. 2
IO-ILINE	Instrument lines, such as pneumatic	Magenta	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-7 (cont.) Startup Layer Naming Standard - Instrumentation & Control (I&C) Drawings

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
P&ID DRAWING SPECIFIC LAYERS (Continued)				
IO-CVAL	Control valves	Cyan	Continuous	Pen No. 3
IO-SLINE	Software link line	Magenta	Continuous	Pen No. 3
IO-EQP	Equipment	141	Continuous	Pen No. 3
IO-MAJ	Major process lines	Red	Continuous	Pen No. 5
IO-MIN	Minor process lines	Yellow	Continuous	Pen No. 4
IO-PROC	Process line	152	Continuous	Pen No. 2
IO-PIP	Piping valves and fittings	121	Continuous	Pen No. 3
PLANS, ELEVATIONS, DETAILS, AND ASSEMBLY DRAWING SPECIFIC LAYERS				
IO-TUBE	Tubing	52	Continuous	Pen No. 2
IO-BGND	Background	8	Continuous	Pen No. 1
IO-PIPE	Piping	12	Continuous	Pen No. 2
IO-BLDG	Building	8	Continuous	Pen No. 1
IO-EQP	Equipment	143	Continuous	Pen No. 1
IO-INS	Instruments	210	Continuous	Pen No. 4
IO-FRM	Panels, racks, cabinets	32	Continuous	Pen No. 2
IO-WRG	Wiring	92	Continuous	Pen No. 2
IO-CVAL	Control valve	130	Continuous	Pen No. 4
WIRING/TUBING DIAGRAM DRAWING SPECIFIC LAYERS				
IO-WRG	Wiring	Green	Continuous	Pen No. 4
IO-INS	Instruments	Magenta	Continuous	Pen No. 2
IO-DCS	Distributed control system instruments	132	Continuous	Pen No. 2
IO-TBLK	Terminal blocks	152	Continuous	Pen No. 2
IO-SLINE	Software lines	12	Continuous	Pen No. 2
IO-TUBE	Tubing	Yellow	Continuous	Pen No. 4
LOGIC/BLOCK DIAGRAM DRAWING SPECIFIC LAYERS				
IO-GATE	Logic gate/memory latch	Green	Continuous	Pen No. 4
IO-SPATH	Software signal path	12	Continuous	Pen No. 2
IO-HPATH	Hardware signal path	152	Continuous	Pen No. 2
IO-INS	Instruments	211	Continuous	Pen No. 3
IO-DCS	Distributed control system instruments	Cyan	Continuous	Pen No. 3

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-8. Startup Layer Naming Standard - Mechanical Drawings

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
GENERAL LAYERS				
MO-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
MM-DIM	Dimensioning	253	Continuous	Pen No. 1
MT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
MT-BTXT	Bold text	Yellow	Continuous	Pen No. 4
MT-CHK	Checker's marks (informal only)	11	Continuous	Pen No. 3
MO-VPT	Paper space Viewport border	White	Continuous	Pen No. 2
MC-CLINE	Center line	Blue	Center	Pen No. 2
MX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
MH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
MV-MLN	Matchlines	Red	Phantom	Pen No. 5
SPECIFIC LAYERS				
MO-1DET	Detail	Yellow	Continuous	Pen No. 4
MO-2DET	Detail	Green	Continuous	Pen No. 4
MO-FAST	Fasteners	Cyan	Continuous	Pen No. 3
MO-VEND	Vendor information	8	Continuous	Pen No. 1
MP-PHANT	Moving parts, alternate positions, simplified drafting techniques, e.g., screw threads, springs	8	Phantom	Pen No. 1
MO-LAYOUT	Layout and/or construction lines	Magenta	Continuous	Pen No. 2

ATTACHMENT B – LAYER NAMING STANDARDS FOR AUTOCAD DRAWINGS BY DISCIPLINE (cont.)

Table B-9. Startup Layer Naming Standard - Piping Drawings

LAYER NAME	DESCRIPTION	LINE COLOR	LINETYPE	PLOTTER PEN NUMBER
PIPING DRAWING, JUMPER ASSEMBLY 1 DRAWING, JUMPER ASSEMBLY 2 DRAWING, and JUMPER ASSEMBLY 3 DRAWING GENERAL LAYERS				
PO-BRD	Title block, associated blocks, and drawing border	132	Continuous	Pen No. 2
PM-DIM	Dimensioning	253	Continuous	Pen No. 1
PT-TXT	General text not associated with a specific layer	White	Continuous	Pen No. 2
PT-BTXT	Bold text	Yellow	Continuous	Pen No. 4
PT-REF	Reference items and notes that aid CAD users during construction of the drawing	213	Continuous	Pen No. 1
PO-VPT	Paper space Viewport border	White	Continuous	Pen No. 2
PO-CLD	Clouded areas for Hold, ECN, and revision	White	Continuous	Pen No. 2
PE-EXST	Anything existing to remain	8	Phantom	Pen No. 1
PD-DEMO	Existing items /equipment required to be removed or demolished	Cyan	HiddenX2	Pen No. 3
PC-CLINE	Center line	Blue	Center	Pen No. 2
PX-HATCH	Cross-section lines	Blue	Continuous	Pen No. 2
PH-HIDL	Hidden lines	Blue	Hidden	Pen No. 2
PV-MLN	Matchlines	Red	Phantom	Pen No. 5
SPECIFIC LAYERS				
PO-PIPINGS	Single-line pipe, valves and fittings	Yellow	Continuous	Pen No. 4
PO-PIPINGD	Double-line pipe, valves and fitting	52	Continuous	Pen No. 2
PO-EQP	Pumps, vessels, etc.	Magenta	Continuous	Pen No. 2
PO-GND	Grade	8	Continuous	Pen No. 1
PO-CONC	Concrete	8	Continuous	Pen No. 1
PO-STRUCT	New structures	8	Continuous	Pen No. 1
PO-PSUPT	Supports	White	Continuous	Pen No. 2

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING

- A -

- B -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- C -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- L -

- M -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- P -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- Q -

- R -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- S -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- T -

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

ATTACHMENT C – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, ALPHABETIC LISTING (cont.)

- W -

- Z -

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING

Civil

0000.....Drawing List
0100.....Project Key Map
0101.....Area Key Maps
0102.....Area Electrical Key Maps
0103.....Topography
0104.....Outside Lines-Water and Gases
0105.....Outside Lines-Sewers and Piping
0106.....Overhead Piping, Steam Condensate, Air and Chemicals
0107.....Outside Lines-Electrical
0108.....Outside Lines-Telephone and Fire Alarm
0209.....General Maps
0110.....Layout or Plot Plans-General Facility
0111.....Excavation and Finishing Grading
0200.....Roads, Walks, Parking Areas, Fences, and Airport Runways-Details and Profiles
0201.....Railroads-Plans, Details, and Profiles
0202.....Railroad Structures and Details
0300.....Overhead Lines-Piping-Including Steam, Air, Gas, and Acids
0301.....Underground Sanitary Water-Piping
0302.....Underground Process Water-Piping
0303.....Sewer Lines-Sanitary
0304.....Sewer Lines-Process
0305.....Composite of Overhead and Underground Piping
0306.....Underground Lines, Steam, Air, Gas, and Acids
0307.....Fuel Oil Storage and Lines
0308.....Outside Lines-Steam, Air, Gas, and Acids
0400.....Waste Disposal System-Sanitary: Septic Tanks, Tile Fields, Sewage Disposal Plant, Open Ditches, and Surface Drainage and Storm Drainage
0401.....Waste Disposal Systems and Burial Grounds-Process: Cribs, Scavenging Impounding Areas and Waste Facility Maps
0402.....Waste Storage-Tank Farms (including all drawings, except electrical and instrumentation and jumpers)
0403.....Waste Line Encasements-Diversion Boxes and Related Components
0404.....Sodium Disposal Area-Burial Grounds
0405.....Waste Storage Process Underground Tanks
0500.....Wells, Well Fields-Irrigation Ditches and Water Supply
0501.....Miscellaneous Survey Data-Columbia River Data, Civil Data
0600.....Rock Boring
0701.....Essential Drawings - Simplified
0702.....Essential Drawings - Fire Walls
0703.....Essential Drawings – Evacuation

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

Architectural and Structural

0800.....Architectural-Plans-May include other 0800 Category
0801.....Architectural-Elevations, Section and Details-Miscellaneous Steel for Stairs, Railing, etc
0802.....Architectural-Other (includes schedules, architectural equipment details, such as bins, signs, cabinets, laboratory equipment, etc.)
0803.....Architectural Doors-Shielding-Windows
0804.....Architectural-Equipment Locations
0900.....Concrete Structural-Plans
0901.....Concrete Structural-Elevations, Sections, and Details
0902.....Concrete Structural-Shop, Reinforcing and Pour Drawings
0903.....Concrete Structural-Penetrations, Sleeve and Block out
0904.....Concrete Structural-Penetrations Embedment Schedules
0905.....Concrete Structural-Demolition
1000.....Steel Structural-Plans, Details, Schedules, Equipment Supports, Platforms
1001.....Steel Structural-Shop or Fabrication Drawings
1002.....Steel Structural-Penetrations
1100.....Steel Structural-Other Stop Logs, Underwater Doors, Trap Gates, Special Non-shield Doors, Allowable Floor Load Data
1101.....Steel Structural-Bench Marks and Control
1201.....Fire Protection, Fire Barrier Walls

Mechanical

1500.....Test or Special Purpose Reactor
1501.....Production or Power Reactor
1502.....Reactor Fuel Transfer
1507.....Reactor In-Vessel Storage Model
1503.....Reactor Instrument Tree and Drive Mechanism
1504.....Reactor Control Rod and Drive Mechanism
1505.....Reactor In-Vessel Handling and Drive Mechanism
1506.....Reactor Core Restraints
1508.....Reactor Out Shield
1509.....Reactor Inner Shield
1510 .....Reactor Ex-Vessel Fuel Handling Equipment
1550.....Reactor Vessels-Arrangements Plans, Elevations, and Sections
1551.....Internal Structural Component Including Reactor Head
1552.....Internals, Nonstructural Items Excluding Controls and Fuel Associated Equipment
1553.....Guard Vessel-Exterior Shields and Other Cavity Components
1575.....Equipment Outline and Interface Requirement
1600.....Moderator-Other than Graphite
1601.....Moderator-Graphite
1800.....Shielding-Biological
1801.....Shielding-Thermal
1802.....Radiation Dose Rates

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

1900.....Control Systems-Horizontal Rods
1901.....Control System-Vertical Rods
1902.....Control System-Poison
1903.....Tools and Equipment for Horizontal Control Rods and Vertical Safety Rods Renovation
1905.....Control Rods
1906.....Control Rods, Assembly Tooling and Handling Equipment
1907.....Control Rod, Absorber, Drive, Disconnect
1909.....Rods Safety (SR)
1911.....Rods Scram (CR)
2100.....Third Safety System-Ball 3X
2200.....Process Tubes (This covers all phases or process tubes from entry of water from common header to exit of water to common discharge header also tubes from point charging machine connects to the point that fuel is discharged.)
2201.....Tools and Equipment (necessary for installation or removal of process tubes and their associated parts. Includes tool dolly)
2202.....Tools and Equipment for Process Tube Growth Correction
2204.....Tools and Equipment for Decontamination
2205.....Tools and Equipment for Over Boring Program
2250.....Poison Column and Associated Items
2300.....All Test Equipment Where Operation of Pile is Essential to Operation of Test
2301.....All Facilities Build into Pile for Testing Purposes
2302.....Containers for Disposal of Contaminated Equipment (does not include metal handling buckets and shipping casks)
2303.....Experimental Test Facilities, Excluding Fuel Specimens
2400.....Charging Machines
2401.....Discharging and Manipulator for Rear Face Work
2450.....Fuel Handling-Irradiated (transfer, etc.)
2452.....Ex-Vessel Irradiated Fuel Handling Equipment
2451.....In-Vessel Fuel Handling Equipment
2500.....Vessels, Columns, Tanks, Dissolvers, Heat Exchangers (no moving parts)
2501.....Sodium Storage Tanks
2502.....Waste Storage Tanks (contaminated waste)
2504.....Gas Storage Tanks
2505.....Sodium Processing Tanks
2600.....Machines-Process: Agitators, Pumps, Scales, Pulse Generators (moving parts)
2700.....Machines and Equipment (non-contaminated zones) Shop or General Purpose
2800.....Cell Equipment Fastened to Cell for Mounting Vessels, Nozzles, Dunnage, Y Pads, etc.
2900.....Reactor Gas Seal, Including Boots Strips, etc.
2901.....Gas Seal Tools
3000.....Fire Protection Sodium Systems
3900.....Cranes (all types)
3901.....Elevators
3902.....Material Handling Equipment such as Conveyors, Pallets, Monorail Systems, Casks, Buckets
3903.....Crane Doors, Shielded, Non-Shielded
4000.....Power House Equipment (associated with steam generation)

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

4050.....Emergency Power Generation Equipment (mechanical)
4100.....Railroad Equipment and Rolling Stock (including cask car)
4101.....Motor Vehicles and Modifications
4300.....Mechanical Equipment for Treatment of Water (other than piping)
4500.....Impact Wrenches
4501.....Remotely Operated Connectors
4600.....Samplers (process, air, stack, gas, etc.)
4700.....Hoods, Caves, Enclosures (remotely operated equipment)
4701.....Tools and Equipment Necessary to Operate Equipment in Hoods, Caves, and Enclosures
4702.....Manipulators
4703.....Testing Equipment-Destructive
4704.....Testing Equipment-Nondestructive
4705.....Equipment Located in Hoods, Caves, Enclosure where Operation is Remote
4706.....Reactor Capsules-Metallurgical Tests
4727.....Metallurgical Test Materials, Destructive and
4750.....Machines and Equipment-Contaminated Zones
4800.....Laboratory Apparatus
4900.....Fuel Element Production-General
490010.....Aluminum Uranium Fuel Elements and Related Components-Caps, Spires, Cans, Sleeves, Cores, Hollow Pieces, or Perfs, Dummies, Spaces, Wafers, Self-Supports
490020.....Zircaloy-Uranium Fuel Elements, Billets, and Related Components-Cores, Copper or Zircaloy Components, End Caps or Plates, Brazing Rings, Self-Supports, Mixers, Perfs, Dummies
490030.....Ceramic Fuel Elements and Related Components
490040.....Plutonium Fuel Elements and Related Components
490050.....Other Fuel Elements, as Cluster
4901.....Fuel Element Production-Cleaning and Preparation
490102.....Core Preparation-Pickle Machine-Etch Machine, Nickel Plating
490104.....Aluminum Component Preparation-Caps and Can Cleaning Machine, Methanol Still, Detrex Trichlor Still, Trays, Baskets, Racks
490106.....Sleeve Preparation-Sleeve Cleaning Machine, Baskets
490108.....Penetration, Loader, Baskets
490110.....Billet Core Preparation
490112.....Zircaloy Component Preparation
490114.....Nose and Cutoff Preparation
490116.....Other
490118.....Chemical Tanks and Piping
4902.....Fuel Element Production-Fuel Element Assembly Equipment
490202.....Duplex Furnace and Equipment-Ajax Induction Furnaces, Duplex Agitators, Agitator Baskets, Loader Shields, Tools
490204.....Canning Furnace and Equipment-Canning Jacks, Canning Baskets, Tongs, Shields, Tools
490206.....Canning Cycle Control, Flex-O-Timer, Valves, etc
490208.....Quench Machines, Tanks, and Equipment
490210.....Machining, Forming, Including Tooling-Acme Gridley Cut-Off Lathes: Monarch Lathe
490212.....Welders, Buffers, Controls, Collets, and Vacuum Welders
490220.....Co-extrusion Component and Billet Assembly

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

490222 .....Extrusion Presses, Containers, Dies, and Tools
490224 .....Other, Including Triple Dip, Hot Press, Heat Treatment, Hydraulic Press, Hevi-Duty Resistance Furnaces
4903 .....Fuel Element Production-Testing and Inspection
490302 .....Component Mechanical Inspection-Pickle Inspection, Statistical Sampling, Recovered Core Inspection, Gages
490304 .....Component Electronic or Ultrasonic Testing-Transformation Test, Sort Tester, etc
490306 .....Fuel Element Inspection-Radiography Inspection, Final Inspection Station, Weld Inspection, Length, Braze and Contour Inspection, Film Developing Equipment
490308 .....Fuel Element Testing, Bond and Pen Tester, Autoclave Test, Bubble Tester
4904 .....Fuel Element Production-Component Salvage and Recover: Scrap Recovery
4905 .....Fuel Element Production-Component Testing (not for new drawings)
4906 .....Fuel Element Production-Component Supporting Facilities (not for new drawings)
4907 .....Fuel Element Production-Special Items-Stampers; Tables; Bins; Mechanical Counters
4920 .....Capsule Storage for Strontium
4921 .....Capsule, Storage for Cesium
4922 .....Fuel Driver Assembly
4925 .....Fuel Closed-Loop In-Reactor Assembly
4928 .....Fuel Special-Purpose Assembly
4931 .....Fuel Material Open Test Assembly
4933 .....Post-Irradiation Open Test Assembly
4934 .....Fuel Open Test Assembly
4935 .....Open Test Assemblies-Tooling
4936 .....Materials Open Test Assembly
4937 .....Reflector Assembly
5000 .....Optical Systems and Devices (including TV devices)
5001 .....Viewing Windows and Ports
5002 .....Periscopes
5003 .....Fuels Development
500301 .....Machines, Mechanisms, and Dies for Forming, Fabricating, or Assembling
500302 .....Mechanisms for Testing, Inspection, Calibration, etc
500303 .....Special Tools, Wrenches, etc
500304 .....Baskets, Tubes, Containers, and Component Parts
500305 .....Vacuum Chambers and Component Parts and Equipment
500306 .....Equipment Support, Storage Racks, Hand Trucks, Tables, etc.
5010 .....Shipping Containers, Boxes, Pallets Conforming to DOT and RDT Regulations

Control Systems

5900 .....Instrumentation-General, Index, Notes, Listings
5901 .....Plans, Section, Elevations and Details (including conduit and tubing)
5902 .....Panel Schedules, Wire Run Lists
5903 .....Wiring Diagrams (connections and inter-connections), Elementary
5904 .....Cable Schedules 5905 Tubing Run List
5906 .....Equipment Requirements

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

5907.....Equipment Arrangements
5908.....Schematic Diagrams

Sub-Subject

04 .... Process Radiation Monitor
05 .... Personnel Radiation Monitor
06 .... Underwater Monitor
07 .... Fuel Monitor
08 .... Pressure Monitor
09 .... Temperature
10 .... Process Water Monitor and Sampling
11 .... Process Water
12 .... Process Gas
13 .... Pile Motion
14 .... Calculator (Power)
15 .... Safety Circuits
16 .... Biological and Thermal Shield T/C System
17 .... Ventilation Controls
18 .... Power Plant Controls
19 .... Dissolver Cells
20 .... Metal Solution Feed Preparation
21 .... Aqueous Make-Up
22 .... Solvent Treatment
23 .... Waste Treatment
24 .... Pre-cycle
25 .... Partition
26 .... Plutonium Decontamination
27 .... Uranium Decontamination
28 .... Recovered Acid Storage
29 .... UNH Storage
30 .... Chemical Storage
31 .... Outside Catch Tanks
32 .... Tank Farms
33 .... Off-Gas Treatment
34 .... Extractors
35 .... Stack Sampling
36 .... Test Hole Facilities
37 .... Seismoscope
38 .... Optical
39 .... Sodium Systems
40 .... Flow and Temperature Monitor Data Logging System
41 .... Main Data-Logging System
42 .... Rod Control System
43 .... Primary and Secondary Loop Instrumentation
44 .... Control Room and Miscellaneous Instrumentation
45 .... Moisture Detection

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

46 .... Argon Systems
47 .... Helium Systems
48 .... Products of Combustion Detectors
49 .... Instrumentation Service Piping, System SDD No. 23
50 .... Instrumentation Radioactive Waste, System SDD No. 24
51 .... Instrumentation Heating and Venting, System SDD No. 25
52 .... Instrumentation Plant Fire Protection, System SDD No. 26
53 .... Instrumentation Reactor Containment System SDD No. 27
54 .... Instrumentation Reactor, System SDD No. 31
55 .... Instrumentation Heat Transport System, SDD No. 51
56 .... Instrumentation Closed Loop, System SDD No. 61
57 .... Instrumentation Aux. Liquid Metal System, SDD No. 81
58 .... Instrumentation Inert Gas Receiving and Processing, System SDD No. 82
59 .... Instrumentation Impurity Monitoring and Analysis, System SDD No. 85
60 .... Instrumentation Reactor Plant Control, System SDD No. 90
61 .... Digital Data Handling and Display, System 91
62 .... Reactor and Vessel Instrumentation, System 92
63 .... Process Monitoring and Control Containment System 93-1
64 .... Process Monitoring and Control Heat Transport System 93-2
65 .... Process Monitoring and Control Closed Loop System 93-3
66 .... Process Monitoring and Control Service Piping, System 93-4
67 .... Process Monitoring and Control Radioactive Waste, System 93-5
68 .... Process Monitoring and Control Heating and Vent, System 93-6
69 .... Process Monitoring and Control Fire Protection System 93-7
70 .... Process Monitoring and Control Inert Gas Receiving and Processing, System 93-8
71 .... Process Monitoring and Control Aux. Liquid Metal, System 93-10
72 .... Process Monitoring and Control Refueling, System 93-11
73 .... Process Monitoring and Control Maintenance, System 93-12
74 .... Process Monitoring and Control Leak Detection, System 93-13
75 .... Process Monitoring and Control Annunciator, System 93-14
76 .... Process Monitoring and Control Piping and Equipment Electrical Heating, System 93-15
77 .... Fuel Failure Monitoring, System 94
78 .... Flux Monitor, System 95
79 .... Radiation Monitoring, System 96
80 .... Plant Protection, System 99
5975.....Equipment Outline and Interface Requirement

Control Systems - General

6000.....Instruments-General
6001.....Temperature
6002.....Flow
6003.....Level
6004.....Pressure
6005.....Density

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

6006.....Humidity
6007.....Moisture
6008.....Conductivity
6009.....Speed
6010.....Viscosity
6011.....Weight
6012.....Specific Gravity
6013.....Weight Factor
6014.....Radiation
6015.....Differential Pressure
6016.....Acidity
6017.....Interface
6018.....Vibration
6019.....Sound
6020.....Component of a Mixture

Sub-Subject
39 .... General
40 .... Recorder
41 .... Controller
42 .... Indicator
43 .... Alarm
44 .... Recorder Controller Alarm
45 .... Indicator Controller Alarm
46 .... Integrator
47 .... Self-Actuated Regulating Valve
48 .... Transmitters
49 .... Primary Elements
50 .... Accelerator
51 .... Alpha
52 .... Amplifier
53 .... Analyzer
54 .... Calculator
55 .... Calibrator
56 .... Camera
57 .... Chambers
58 .... Checkers
59 .... Counters
60 .... Probes

Electronics - General

6500.....Electronics-General (wave type-includes radio, TV, microwave and laser)
6501.....Electronics-Plans, Elevations, Sections, and Details
6502.....Electronics-Wiring Diagrams (elementary, connection, and inter-connections)
6503.....Electronics-Transmitters Amplifiers, Receivers, and Control Consoles

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

6504.....Electronic-Wave Guides and Antennas
6505.....Electronic-Drill and Trim

Flow Diagrams

7000.....Process Flow Diagrams
7001.....Engineering Diagrams
7002.....Instrument Engineering Diagrams
7003.....Logic Diagrams
7004.....Piping and Instrument Diagram
7005.....Piping and Instrument Diagram CLS

Electrical

Numerical Subject Series: 73, 74, 75, 76, and 77 (Cover Inside Building - Electrical) 78 and 80 (Cover Outside Building - Electrical)

7100.....Electrical-General, Wiring Requirements (This series includes drawings of a composite nature. A drawing which shows a complete installation for a facility.)
7101.....Block Outs, Sleeves, Plans, and Details
7107.....Studies-General
7108.....Material Lists-General
7109.....Indices
7201.....One-Line Diagrams
7301.....Power-Plans, Elevations, Sections, and Details (including grounding, block diagrams, and engineering diagrams)
7302.....Power-Wiring Diagrams (elementary, connection, and inter-connection)
7303.....Power-Motor Control Centers, Switchgear, Transformers, and Control Panels
7304.....Power-Panel Schedules
7305.....Power-Wire Run Lists, Conduit, Cable, Wire Schedules, and Tray Schedules
7306.....Power-Grounding Junction, Pull Boxes, Ducts, Raceways
7307.....Power-Motor and Control Station Schedules
7308.....Power-Electrical Equipment (motors, heaters, etc.)
7309.....Power-Lighting Protection
7401.....Lighting-Plans, Elevations, Sections, and Details
7402.....Lighting-Wiring Diagrams (elementary, connections, and inter-connections)
7404.....Lighting-Panel, Schedules
7405.....Lighting-Wire Run Lists, Conduit, Cable and Wire Schedules
7406.....Lighting-Junction Pull Boxes, Ducts
7501.....Electrical Control-Control Panel Arrangements, Signal Plans, Elevations, Sections, and Details
7502.....Electrical Control-Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7503.....Electrical Control-Timing Charts
7504.....Electrical Control-Panel Schedules
7505.....Electrical Control-Wire Run Lists, Conduit, Cable and Wire Schedules

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

7506.....Electrical Control-Junction Pull Boxes, Ducts (This series includes remote signaling door bells, buzzers, annunciators.)
7507.....Electrical Control-Relay and Switch Schedules
7508.....Electrical Control-Control Equipment and Devices
7575.....Equipment Outline and Interface Requirement
7601.....Communications-Plans, Elevations, Sections, and Details
7602.....Communications-Wiring Diagrams (elementary, connections, and inter-connection) Block Diagrams
7604.....Communications-Panel Schedules, Equipment, and Devices
7605.....Communications-Wire Run Lists, Conduit, Wire Schedules, Cables
7606.....Communication-Junction Pull Boxes, Ducts (This series includes sound-powered telephone and central station system telephones.)
7607.....Communications-Station Schedules
7701.....Fire Alarm-Plans, Elevations, Sections and Details
7702.....Fire Alarm-Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7704.....Fire Alarm-Panel Schedules
7705.....Fire Alarm-Wire Run Lists, Conduit, Cable and Wire Schedules
7706.....Fire Alarm-Junction Pull Boxes, Ducts
7801.....Cathodic Protection-Plans, Elevations, Sections and Details
7802.....Cathodic Protection-Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7806.....Cathodic Protection-Junction Pull Boxes, Ducts
7810.....Lighting Protection-Plans, Elevations, Sections and Details
7900.....Criticality Monitoring Systems
7901.....Plans, Elevations, Sections, and Details
7902.....Wiring Diagrams (elementary, connection, and inter-connection) Block Diagrams
7904.....Panel Schedules
7905.....Wire Run Lists, Conduit, Cable and Wire Schedules
7906.....Junction Pull Boxes, Ducts
8000.....Electrical Utilities Transmission and Distribution Operating Drawings (including switching diagrams and distribution maps)
8001.....Electrical-Maps, Plot Plans, Plans and Profiles, Plans, Elevations, Sections, and Details (includes substation structures)
8002.....Electrical Only-Wiring Diagrams (elementary, connection, and inter-connection) Area One-Line Diagram
8003.....Electrical Only-Pole Line Details, Sag Curves
8004.....Electrical Only-Pole Schedules
8005.....Electrical Only-Cable Schedules
8009.....Electrical Only-Transformer Schedules (This series includes all electrical maps other than the "Civil" map series.)

Insulation and Heat Tracing

8200.....Insulation and Heat-Tracing Reference Designs
8201.....Insulation and Heater Arrangements

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

8202.....Insulation Arrangements
8203.....Heater Applications-Piping
8204.....Heater Applications-Equipment
8205.....Heater Schedules
8206.....Insulation Schedules

Piping

8400.....Piping-Process Water
8401.....Piping-Process Water-Front or Rear Face
8402.....Piping-Process Water-Foundation Cooling, Shielding, Horizontal Rods, Risers, and Cross headers
8403.....Piping-Process Water-Valve Pits or Tunnels
8404.....Piping-Cell Arrangements (includes diversion boxes and trenches)
8405.....Piping-Jumpers
8406.....Piping-Process-Operating or Sample Galleries
8407.....Piping-Process-All other to include: Buried or Exposed Inside Piping, Wash Down, Fog Spray, Solvent Blend, Slug Storage, Hot Shop, Utility Outlets Relative to Process Piping: Also Jets, Valves, Miscellaneous Process Piping
8408.....Piping-Water Drain and Waste (non-contaminated)
8409.....Piping-Radioactive Liquid Waste (water)
8500.....Piping-Water-Other than Process
8501.....Piping-Steam Radiators, Coils, and Condensate
8502.....Piping-Steam-All Others
8503.....Piping-Acids and Chemicals
8504.....Piping-Gas Decay and Disposal
8505.....Piping-Compressed Air
8506.....Piping-Vacuum
8507.....Piping-Refrigeration, Argon
8508.....Piping-Sprinkler Systems
8509.....Piping-Drains and Waste Inside-Other than Process
8510.....Piping-Service (includes grouped services, viz., water, air, steam, drains, etc.; show on the same drawing)
8511.....Piping-Hangers, Support, Anchors, Guards
8512.....Piping-Hydraulic
8513 .....Piping-Demineralized and Distilled Water
8514.....Piping-Fuel Oil
8515.....Piping-Fire Extinguishing Gas, Vapor, Chemical, or Powder
8516.....Piping-Heating and Cooling Water
8517.....Piping-Heating and Cooling NA and NAK, Insulating Requirements
8518.....Piping-Heating and Cooling Gas
8519.....Piping-Cover Gas, Argon
8520.....Piping-Propane
8548.....Piping-Isometric
8550.....Piping-NA Reactor Primary

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

8551.....Piping-NAK Reactor Secondary
8552.....Piping-NA Receiving and Processing
8553.....Piping-NA Closed Loop
855301.....Piping and Mechanical Sections A1, 2, 3
855302.....Piping and Mechanical Sections B1, 2, 3, 4
855303.....Piping and Mechanical Sections C1, 2, 3, 4, 5, 6, 7, 8, 9
855304.....Piping and Mechanical Sections D1, 2, 3, 4, 5, 6
855305.....Piping and Mechanical Sections E1, 2
855306.....Piping and Mechanical Sections F1, 2
855307.....Piping and Mechanical Sections G1, 2, 3
855308.....Piping and Mechanical Sections H1, 2, 3, 4, 5, 6, 7
855309.....Piping and Mechanical Sections J1, 2
855310.....Piping and Mechanical Sections K1, 2, 3, 4, 5, 6, 7
855311.....Piping and Mechanical Sections L1, 2, 3
8554.....Piping-NA all Other
8555.....Piping-Special Loop
8556.....Piping-NA Piping Components, Traps, Cold, Freeze, and Vapor
8557.....Piping-Equipment Outline and Interface Requirements
8576.....Piping-Reference Drawings
8601.....Essential Drawings - Water
8602.....Essential Drawings - Fire Protection
8603.....Essential Drawings - Safety Showers/Eye washes
8604.....Essential Drawings - Gas
8605.....Essential Drawings - Steam
8606.....Essential Drawings - Air
8607.....Essential Drawings - Vacuum
8608.....Essential Drawings - Waste

Heating, Venting, Exhaust

8900.....Ventilation Exhaust and Heating System-Plans, Section Details
8901.....Heating and Ventilating Equipment Location
8902.....Heating and Ventilating Schedules, Notes

Air Conditioning Systems

9000.....Air Conditioning Systems-Plans, Sections, Details

Miscellaneous

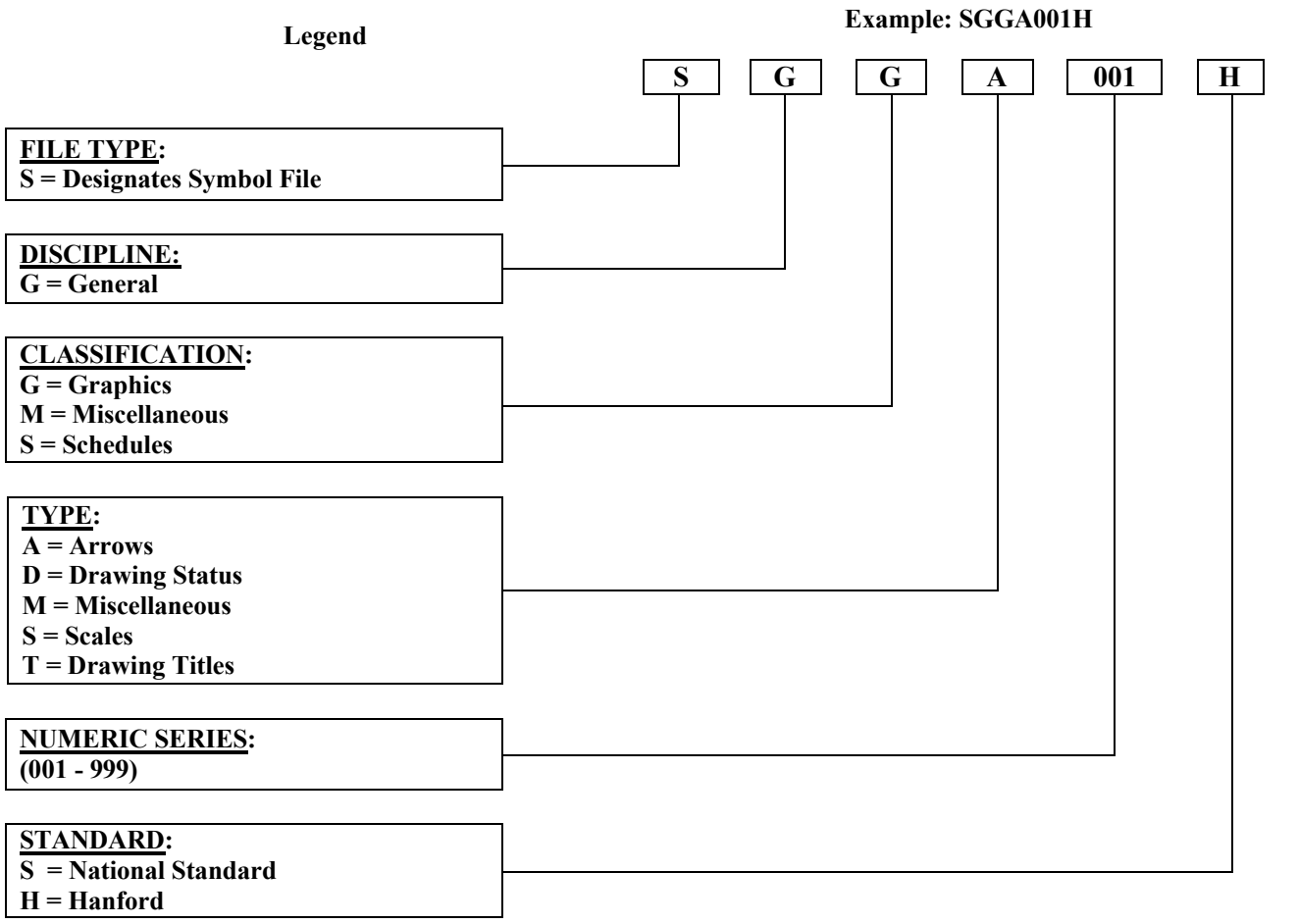
9900.....Miscellaneous Equipment Pieces or Parts-Not Identifiable as Electrical, Instrument or Mechanical Category; Unrelated to the Assembled Equipment
9901.....Mechanical
9902……..Electrical
9903……..Instrument

ATTACHMENT D – INDEX NUMBER SYSTEM FOR ENGINEERING DRAWINGS, NUMERIC LISTING (cont.)

Sub-Subject
01 .... Scope
02 .... Vendor Information
03 .... Special Tools

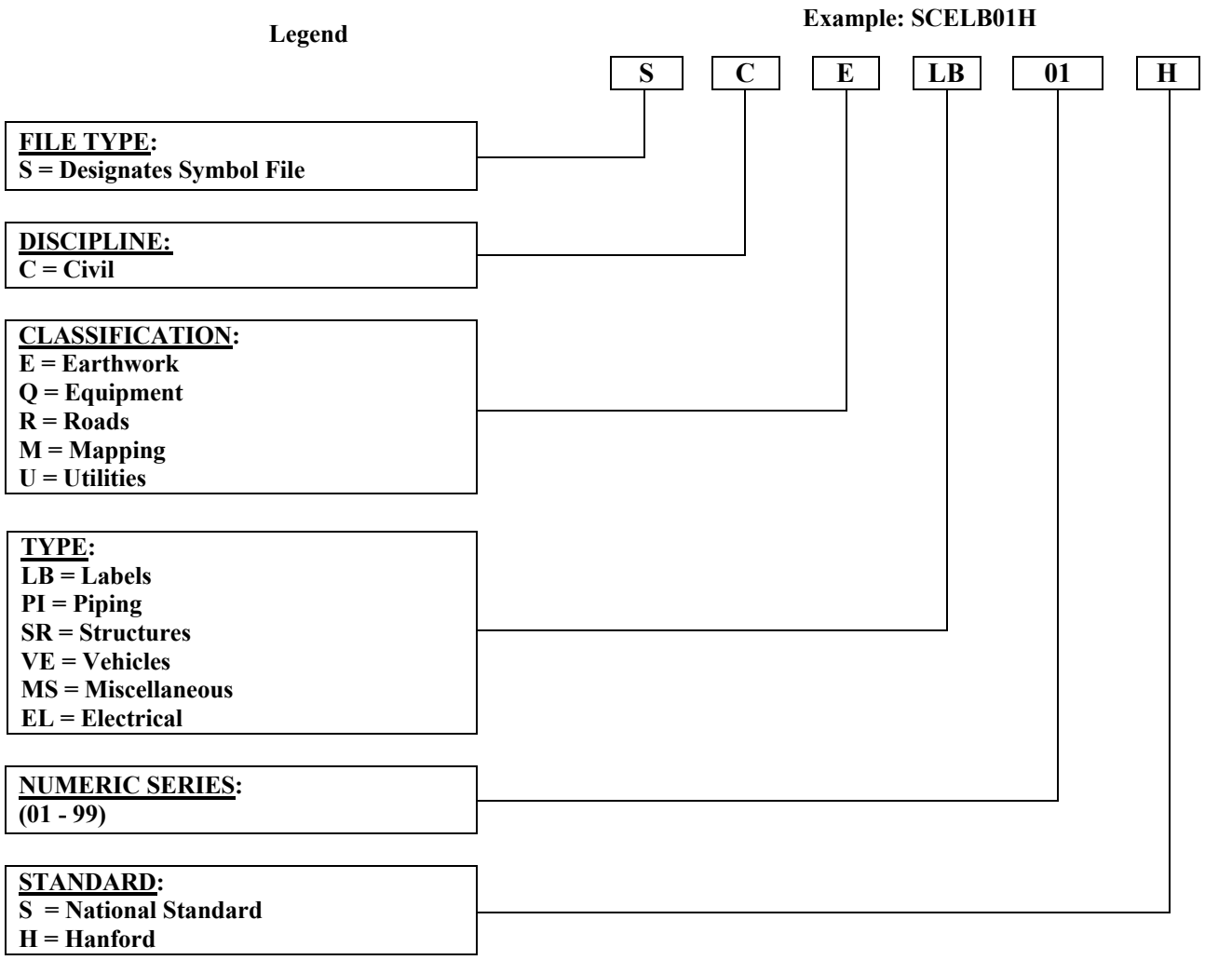
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS

Figure E-1. General Symbology Naming Standards.



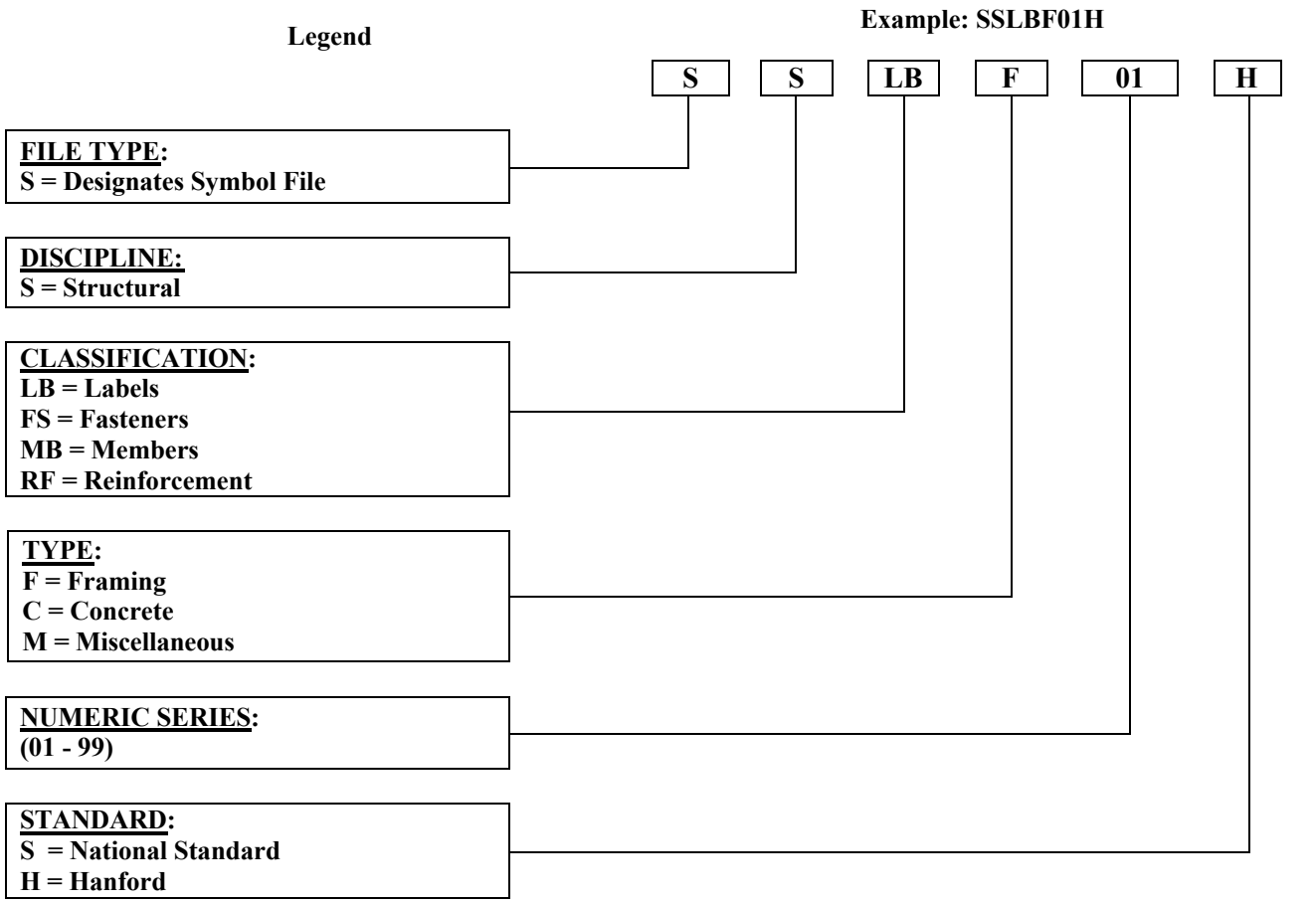
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-2. Civil Symbology Naming Standards.



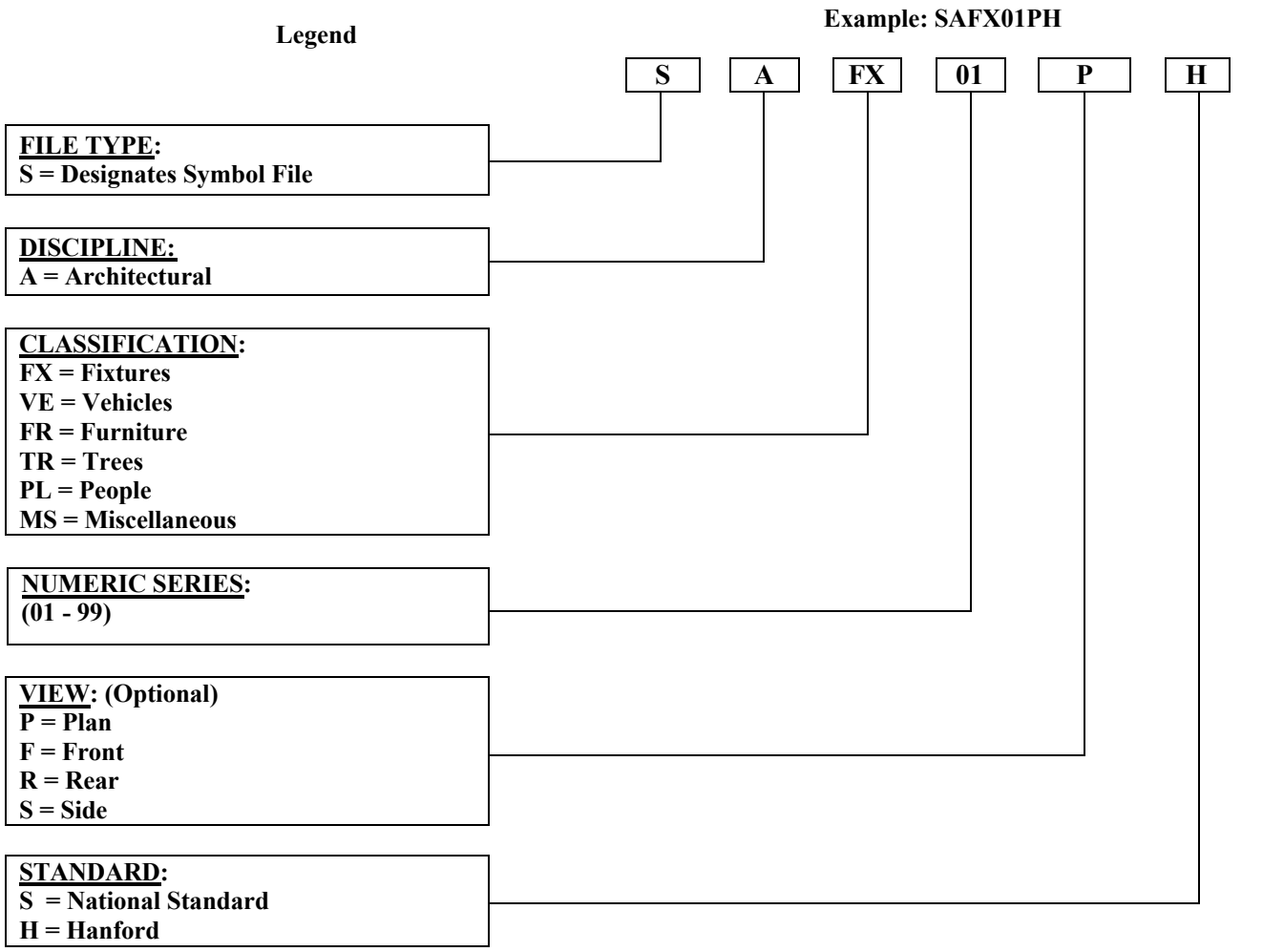
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-3. Structural Symbology Naming Standards.



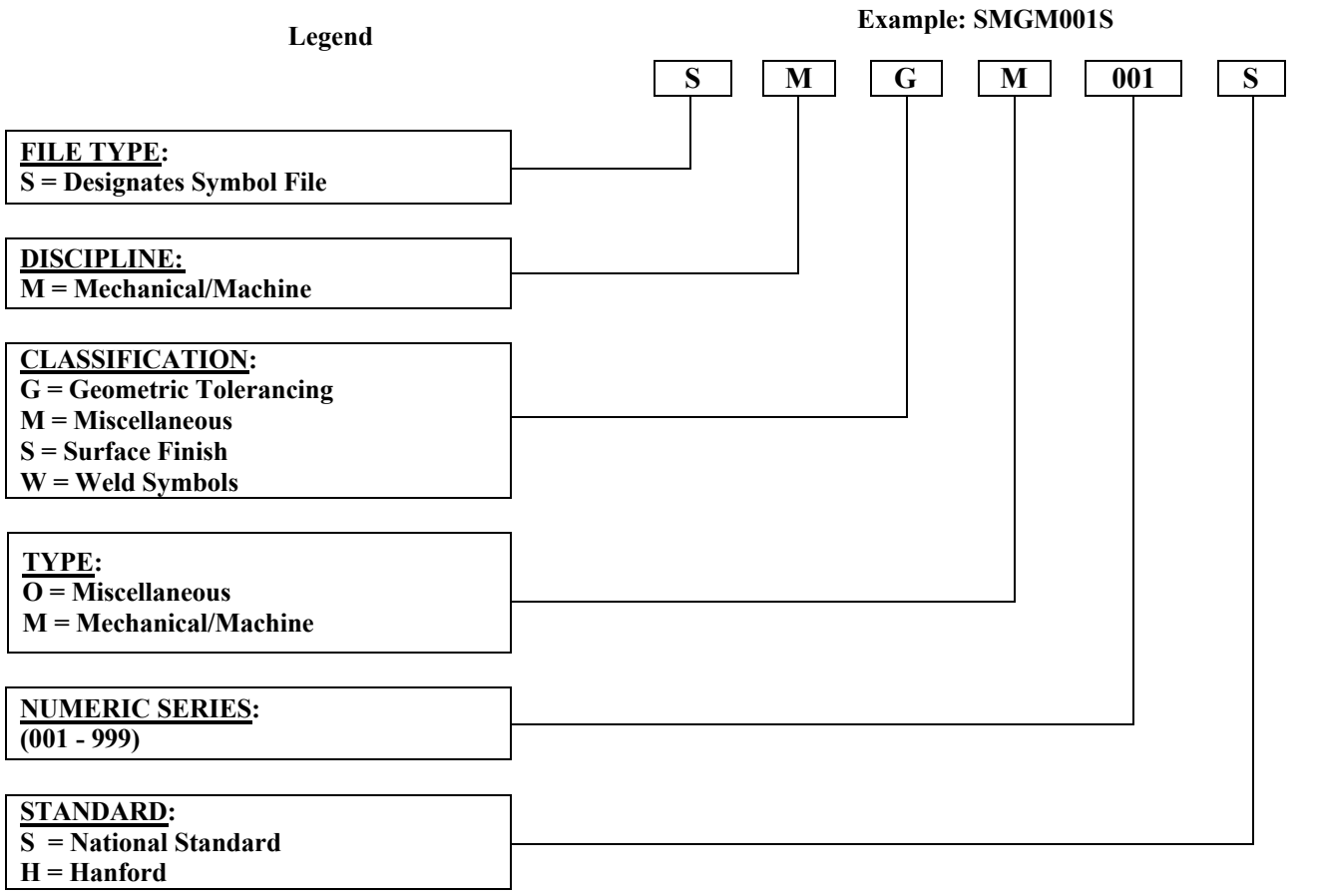
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-4. Architectural Symbology Naming Standards.



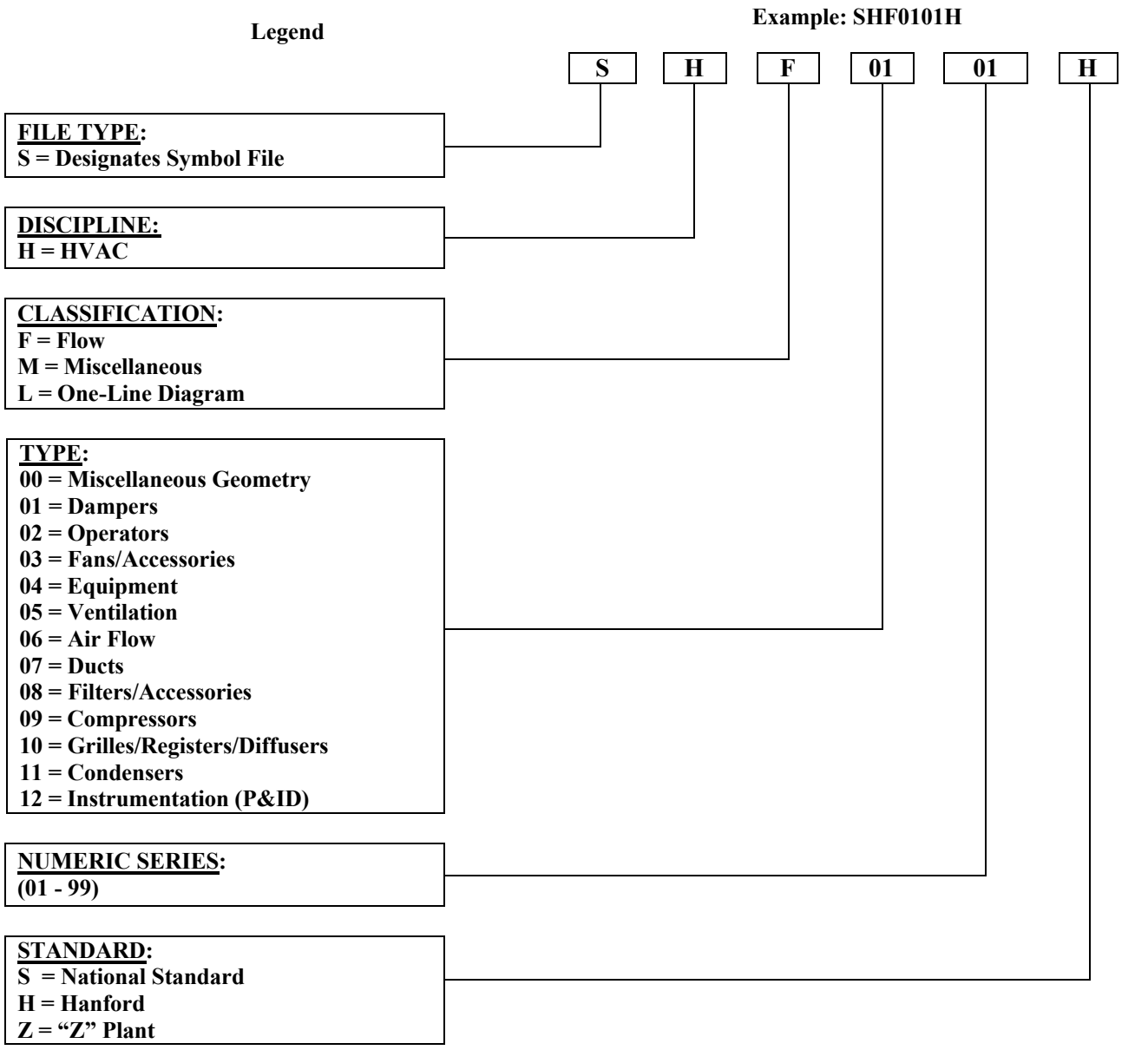
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-5. Mechanical/Machine Symbology Naming Standards.



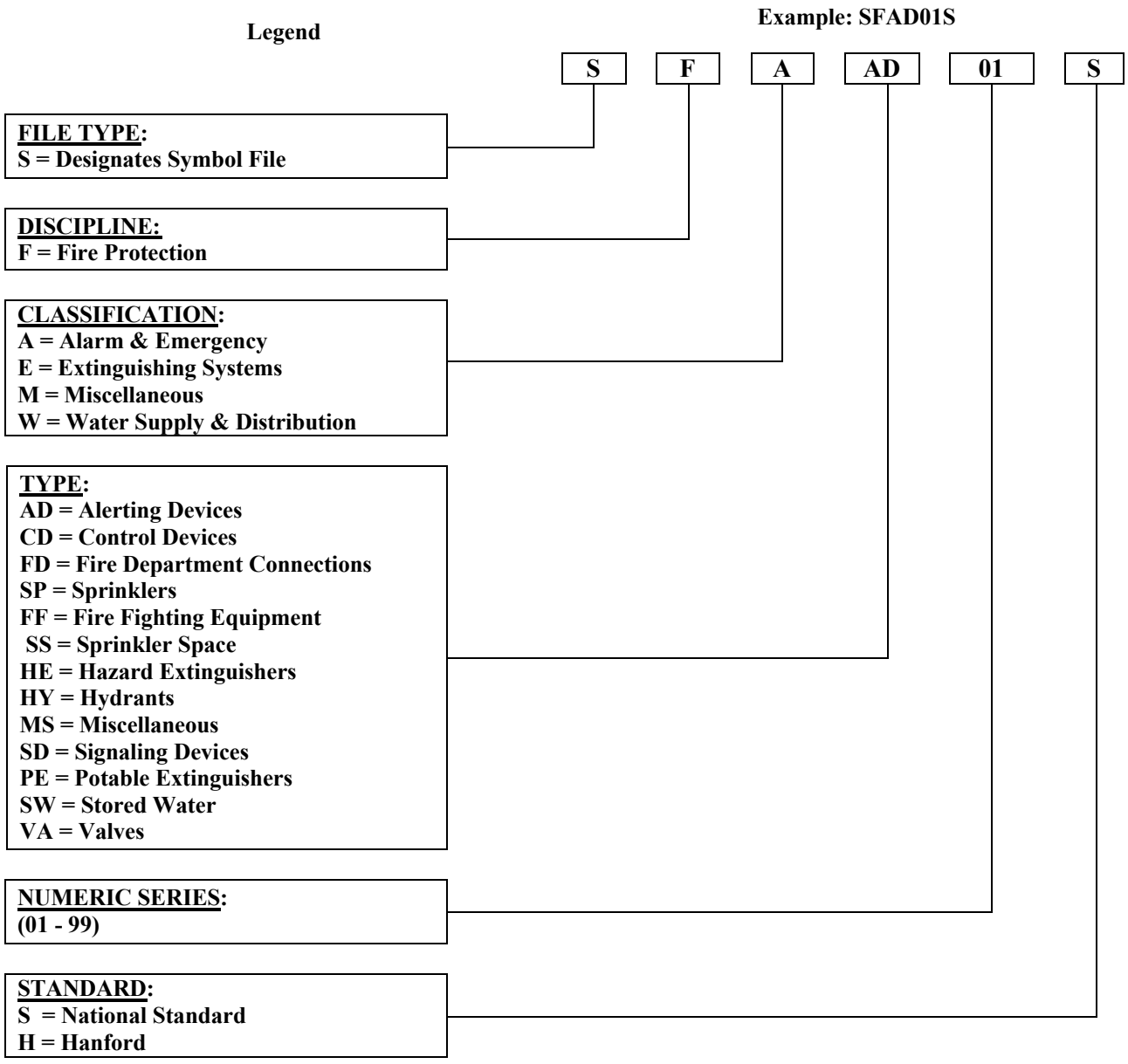
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-6. Hvac Symbology Naming Standards.



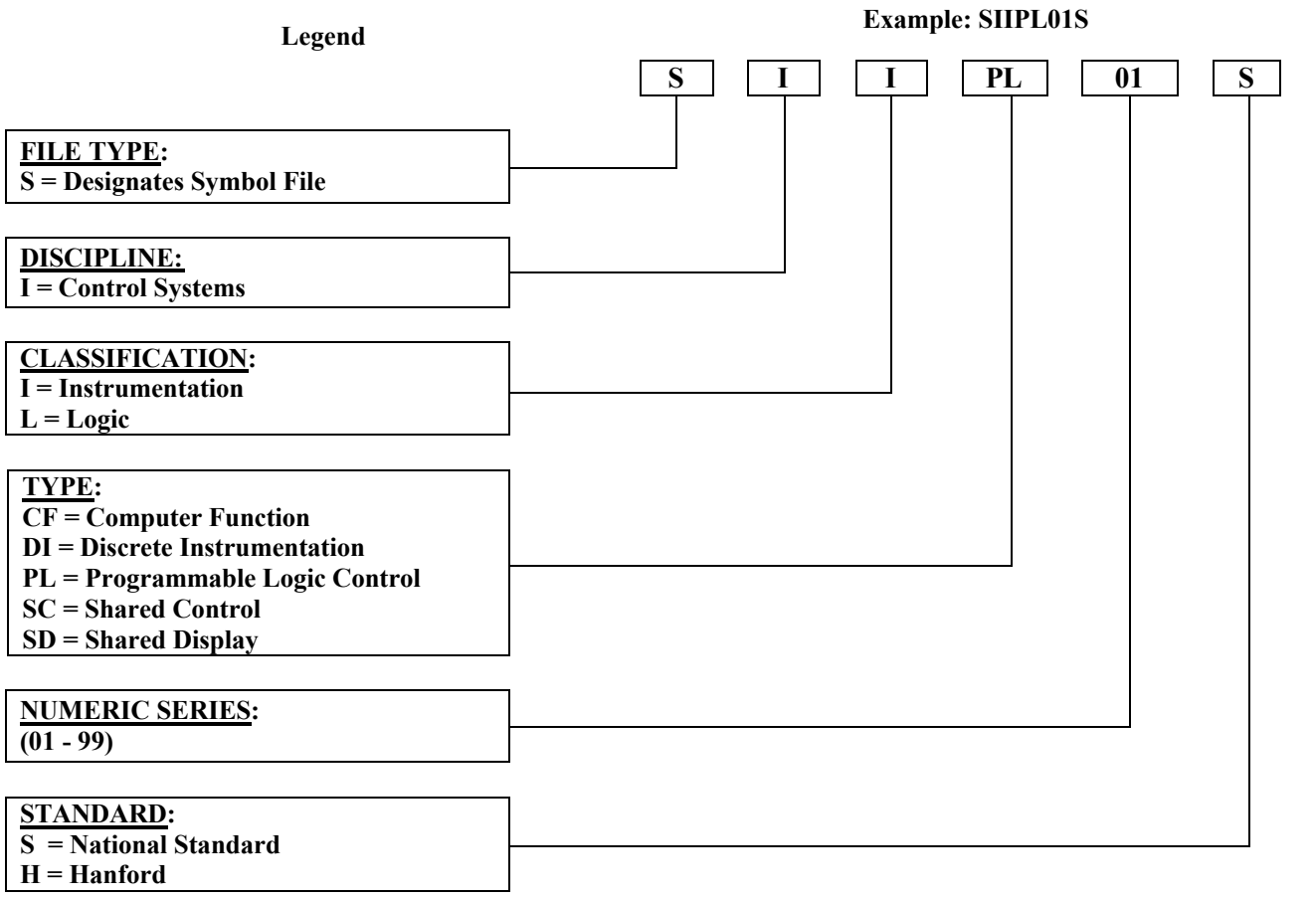
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-7. Fire Protection Symbology Naming Standards.



ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-8. Control Systems Symbology Naming Standards.



ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-9. Electrical Symbology Naming Standards.

Example: SERO001S

S	E	RO0	01	S

Legend

FILE TYPE:
S = Designates Symbol File

DISCIPLINE:
E = Electrical

CLASSIFICATION:

Boxes
BJ0 = Junction, BP0 = Pull, BTO = Terminal

Conduit and Cable
CC0 = Conduit and Cable

Cathodic Protection
CP0 = Cathodic Protection

Elementary
EAR = Arrestor, EBA = Battery, EBR = Breaker
EC0 = Coil, ECC = Coax Conn, ECL = Current Limiter
ECM = Connector-Matted, ECP = Capacitor
ECR = Common Return, ETC = Contact, EDG = Earth Ground
EDI = Diode, EEE = Electronic, EFG = Chassis Ground
EFU = Fuse, EIL = Indicating Light, EMI = Meter/Motor
EOR = Overload, EPC = Programmable Controller
ERB = Rectifier Bridge, ERE = Resistor, ERS = Reactor
ESA = Switch Actuator, ESS = Selector Switch, ESW = Switch
ETC = Thermocouple, ETP = Test Point, ETR = Transformer
EVR = Varistor

Lighting
LF0 = Lighting

One-line
OL0 = General, OLB = Breaker, OLC = Coupling Cap
OLG = Ground Fault, OLH = Shunt, OLM = Motor Control
OLS = Switch, OLT = Transformer

Outside Lines
OS0 = Outside Lines

Power and Control
PO0 = Power and Control

Receptacles
RO0 = Receptacles

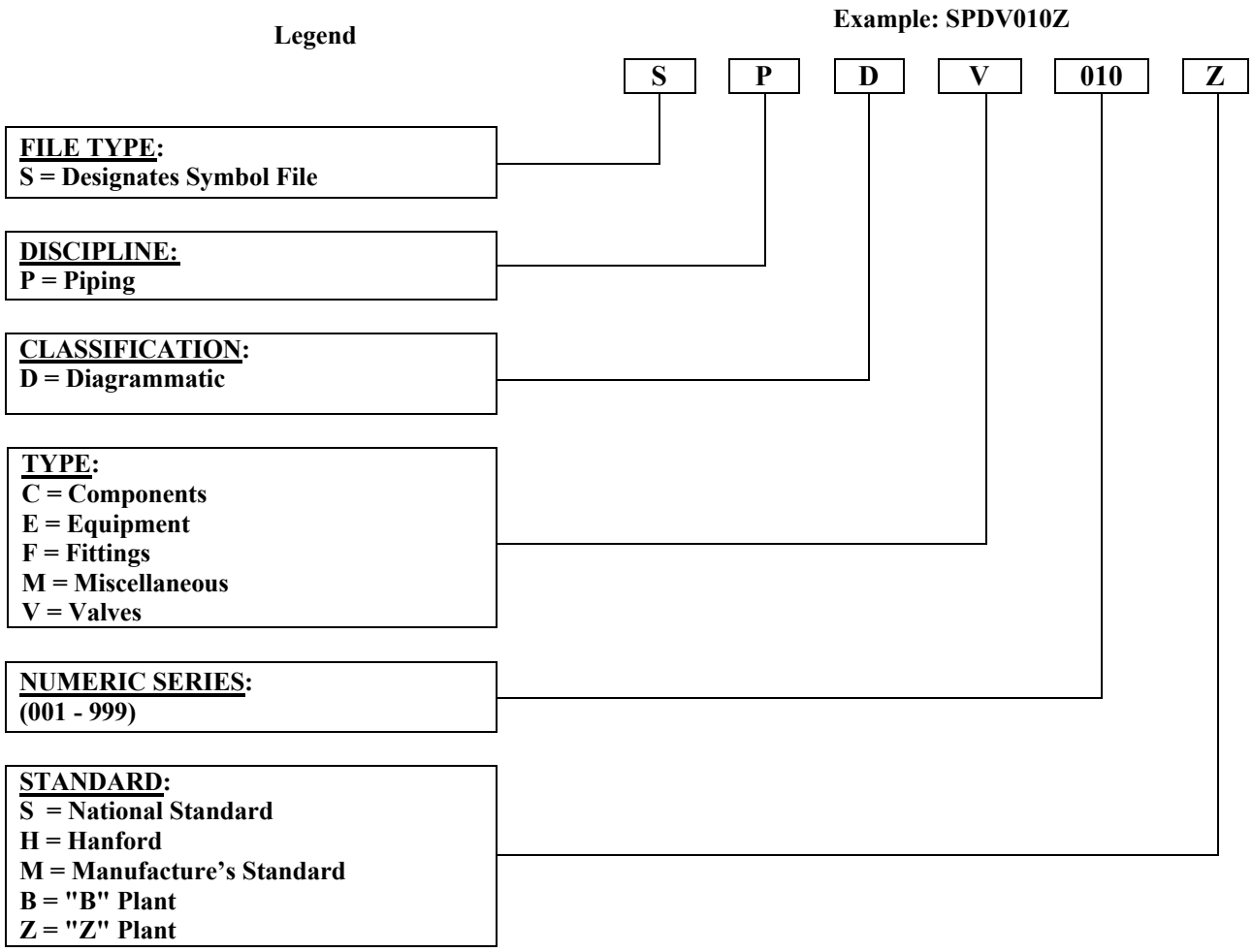
Signaling Devices
SD0 = General, SMD = Motion Detector, SW0 = Motion Detector w/Switch

NUMERIC SERIES:

STANDARD:
S = National Standard
H = Hanford

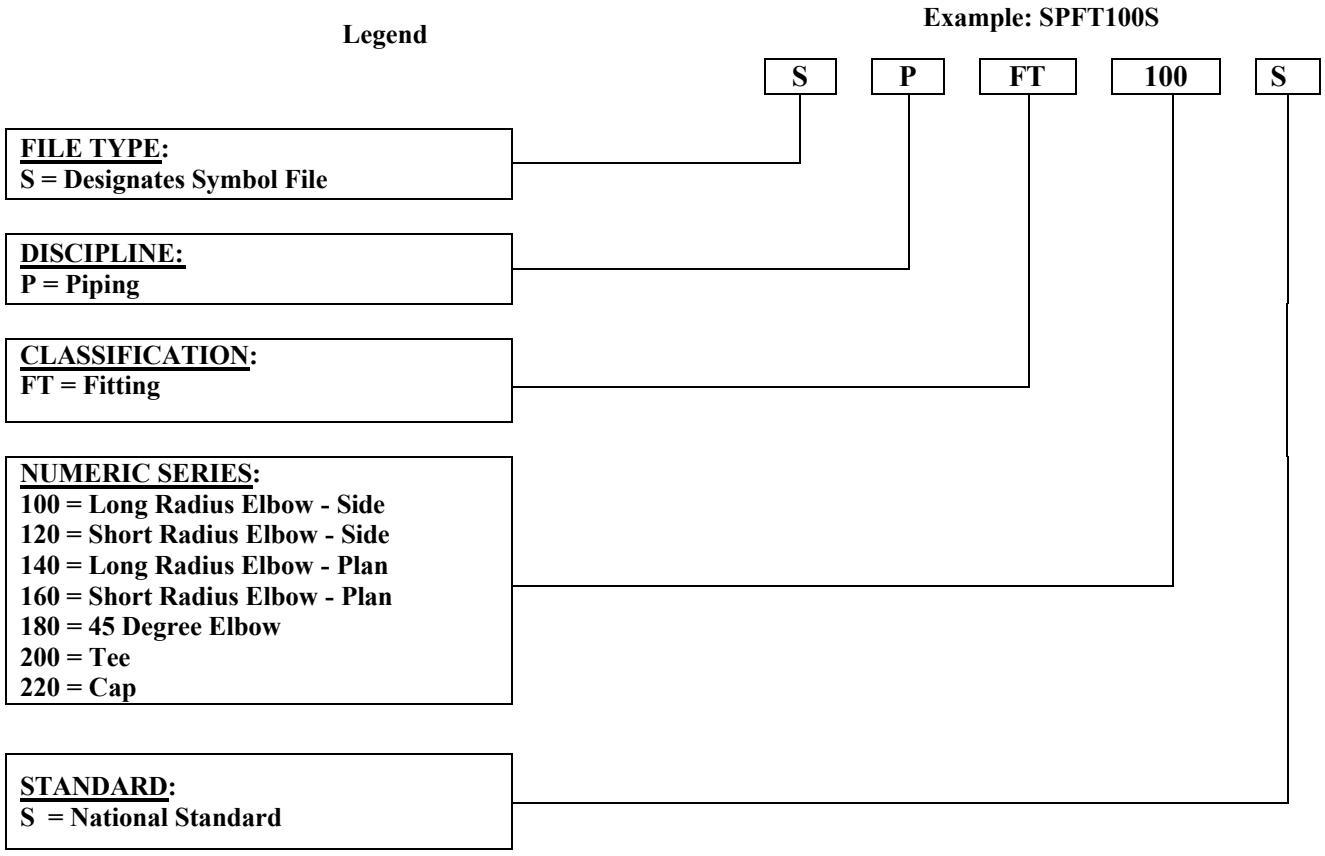
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-10. Piping - P&Id Symbology Naming Standards.



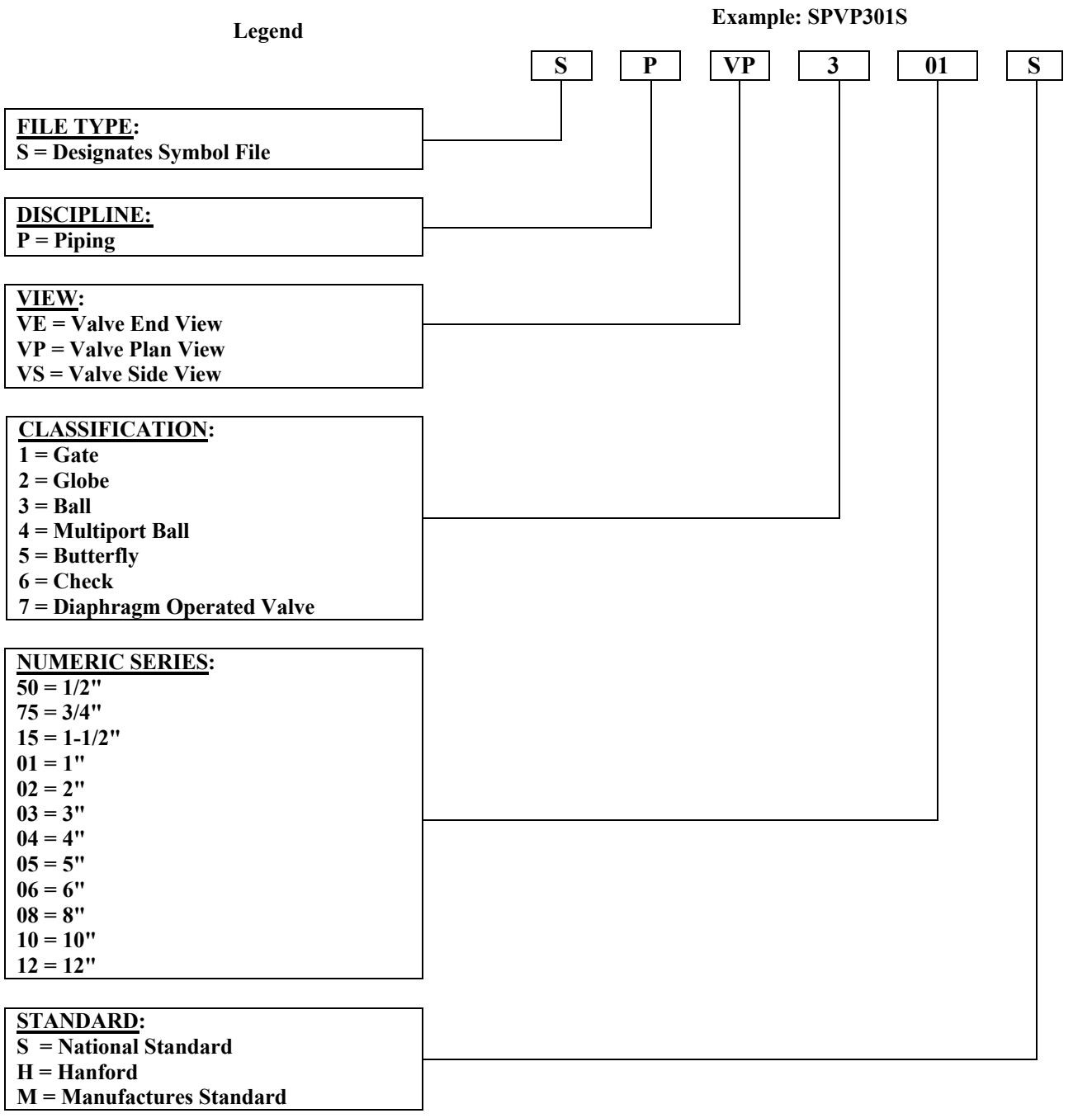
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-11. Piping - Fittings Symbology Naming Standards.



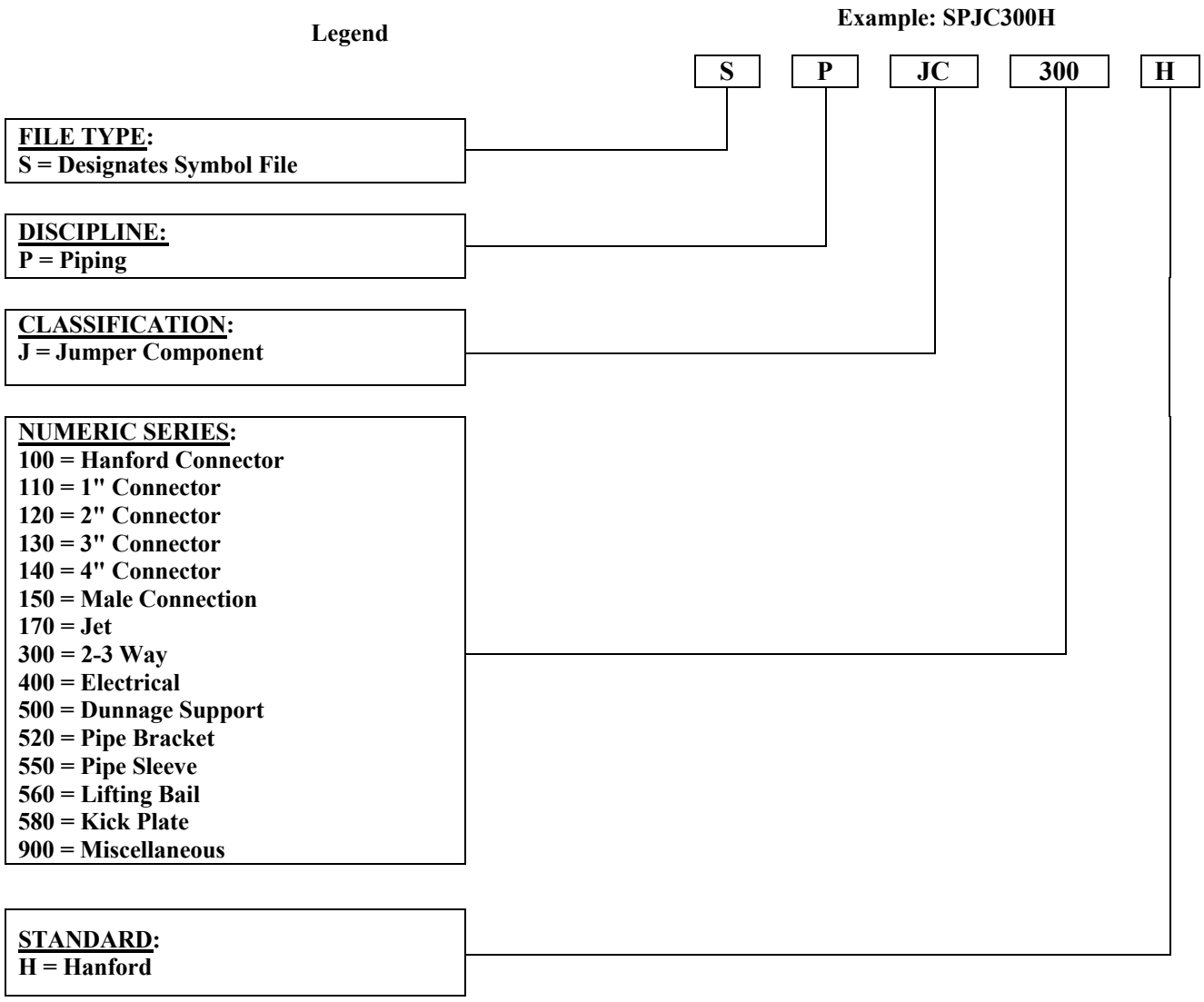
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-12. Piping - Valves Symbology Naming Standards.



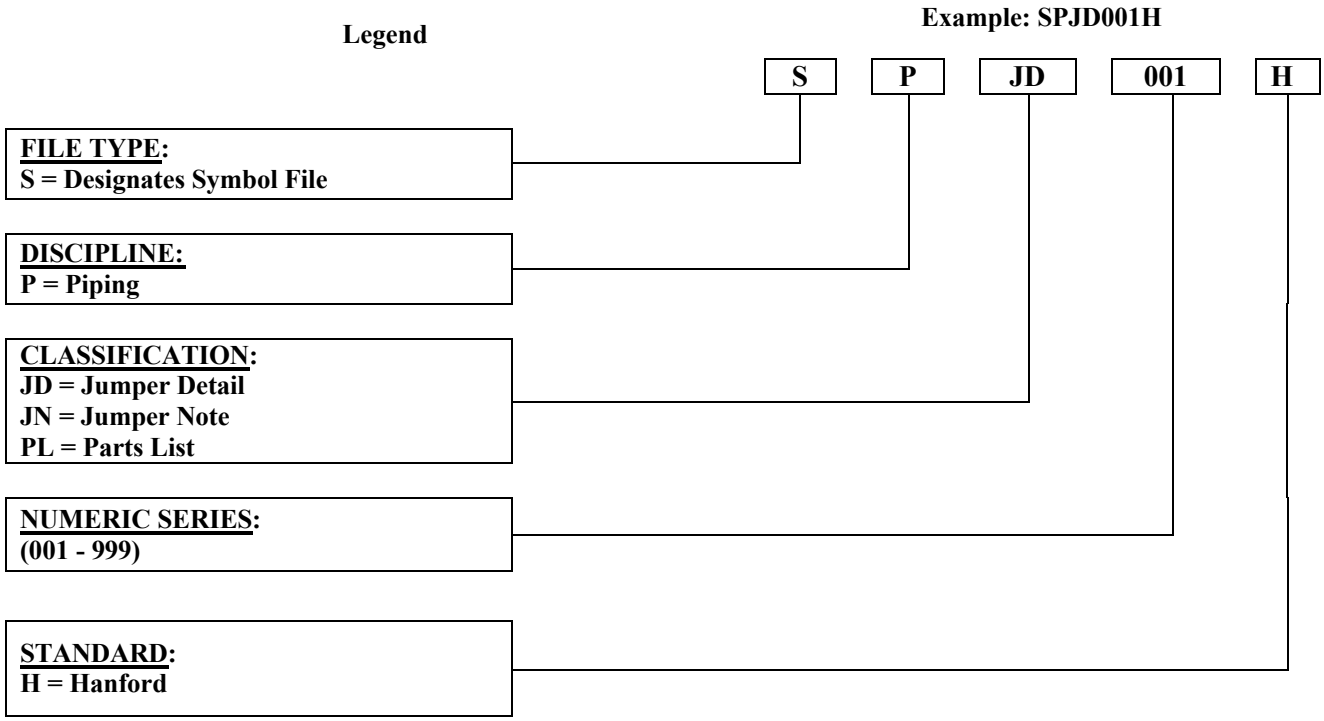
ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-13. Piping - Jumper Components Symbology Naming Standards.



ATTACHMENT E – HANFORD DRAWING SYMBOLOGY STANDARDS (cont.)

Figure E-14. Piping - Jumper Details And Notes Symbology Naming Standards.



ATTACHMENT F – PARTS/MATERIALS LIST

A. Recommended Practices

The following practices are industry proven and will assist in achieving the Parts/Materials List requirements listed in Section 3.22.

B. Arrangement

The Parts/Materials List should be arranged according to the following hierarchy:

1. Arrangement/installation or assembly
2. Subassemblies
3. Detailed items
4. Designed items
5. Commercial/catalog items
6. Hardware, e.g., bolts and nuts
7. Material items.

Three spaces should be provided between each category for future entries, see Example F-1. The sequence of items in the Parts/Materials List may be broken when items added by drawing development, progress, or revisions have used all reserved spaces.

C. Item Number/Find Number System

Items listed in the Parts/Materials List (assemblies, subassemblies, detailed items, commercial items, and material items) should be identified/located on the field of the drawing by item number as shown in Examples F-2 and F-3. Using this system allows the part number to be located in the Parts List and ensures that unique part numbering is maintained.

The item number is placed in a nominal 13 mm (.50") diameter circle with a radial leader pointing to the depicted item (see Figure F-1a).

Figure F-1. Part Call-Outs.

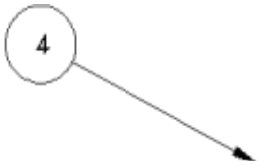


Figure F-1a.

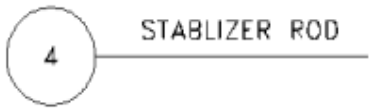


Figure F-1b.

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

Views detailing parts or assemblies should always have the item number centered below the primary view in a nominal 16 mm (.63") circle. The nomenclature/description shown in the Parts List should always be used. The lettering height should be 6 mm (.24") high and underlined (see Figure F-1b).

All associated items are to be located on the primary view where possible. Duplicate item number call-outs required for clarification may be used but held to a minimum and identified as reference call-outs by adding "REF" beside the circle.

D. Multiple Item Call-Outs

Where more than one item must be called out at one location, circled item numbers connected to one leader line may be stacked and quantities indicated as shown in Examples F-2 and F-3.

E. Items Not Requiring Pictorial Depiction

Items that do not require pictorial description for detail will be completely described, including dimensions, in the Parts/Materials List.

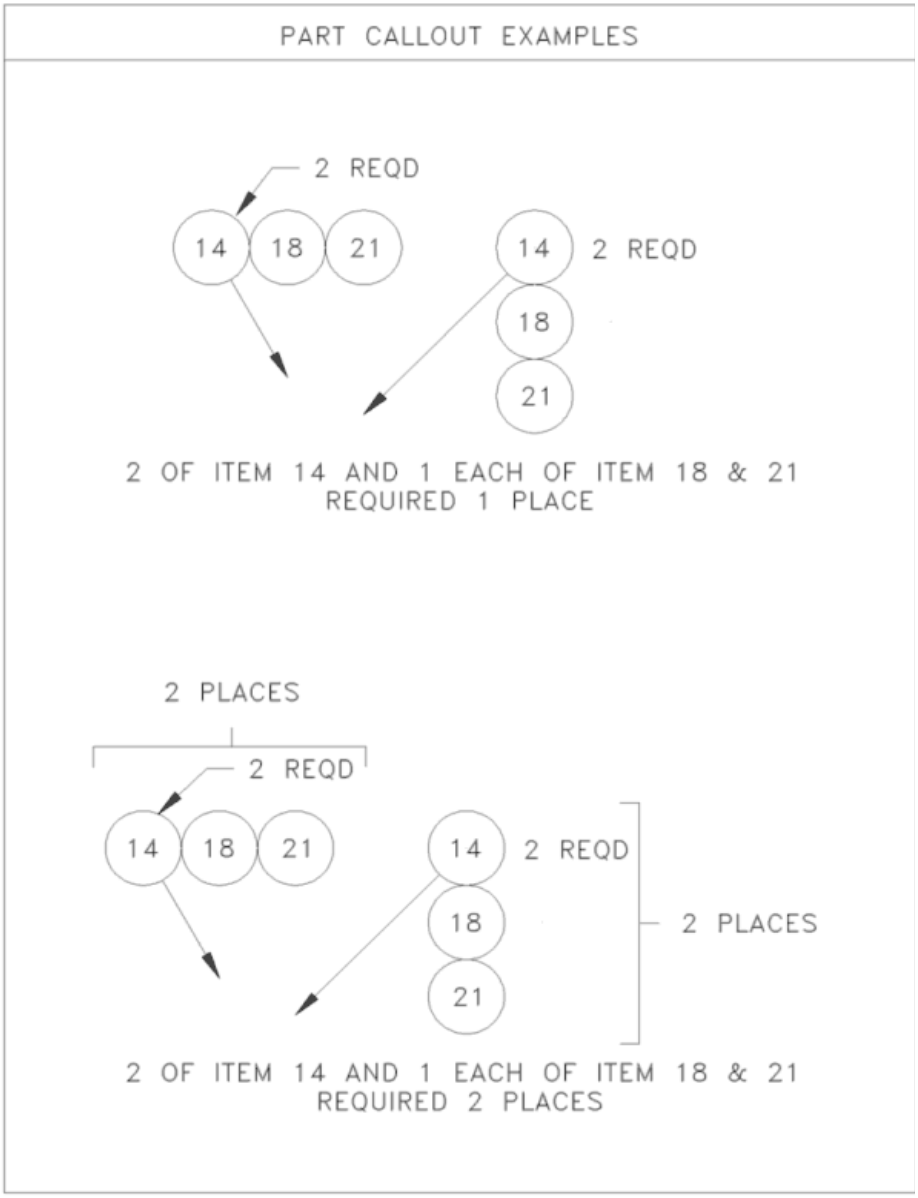
ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

Example F-1. Parts/Materials List.

PARTS/MATERIAL LIST						
QTY -020	REQD -010	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHT	ITEM NO
	X	-010	ASSEMBLY, GANTRY		1	1
X		-020	SUBASSY, GRANTRY TRI-ASJUSTABLE		2	2
						3
						4
						5
1	3	-001	STABILIZER ROD	ASTM A36	2	6
	8	-002	HOLD DOWN CLAMP	ASTM A36	2	7
	1	-003	INSTRUMENT RACK	ASTM A36	2	8
	6	-004	MOUNTING BRACKET	ASTM A36	3	9
						10
						11
						12
	3	H-1-48149-020	SCAFFOLD ASSEMBLY			13
						14
						15
						16
	1	FR211-73	DUPLEX PUMP	MILTON ROY CO		17
	2	(SSS60TF8)	VALVE, BALL, 12 mm FNPT, CL 150	ASTM A275 (WHITNEY)		18
						19
						20
						21
						22
	4		SCREW, SCHD CAP, HEX M6X1-4g6gX50 mm L	ASTM A574M		23
AR	AR		TUBING, TS, 101.6 mm X 101.6 mm X 6.35 mm (4"X4"X.25")	ASTM A500, GR B		24
AR	AR		PLATE, 6.35 mm (.25") THK	ASTM A36		25
2	1		CONTINUOUS HINGE, BLANK, W/PIN 1.52 mm (.060") THK X 38.1 mm (1.50") WIDE X 1828.8 mm (72") LONG	TP 304 SST		26

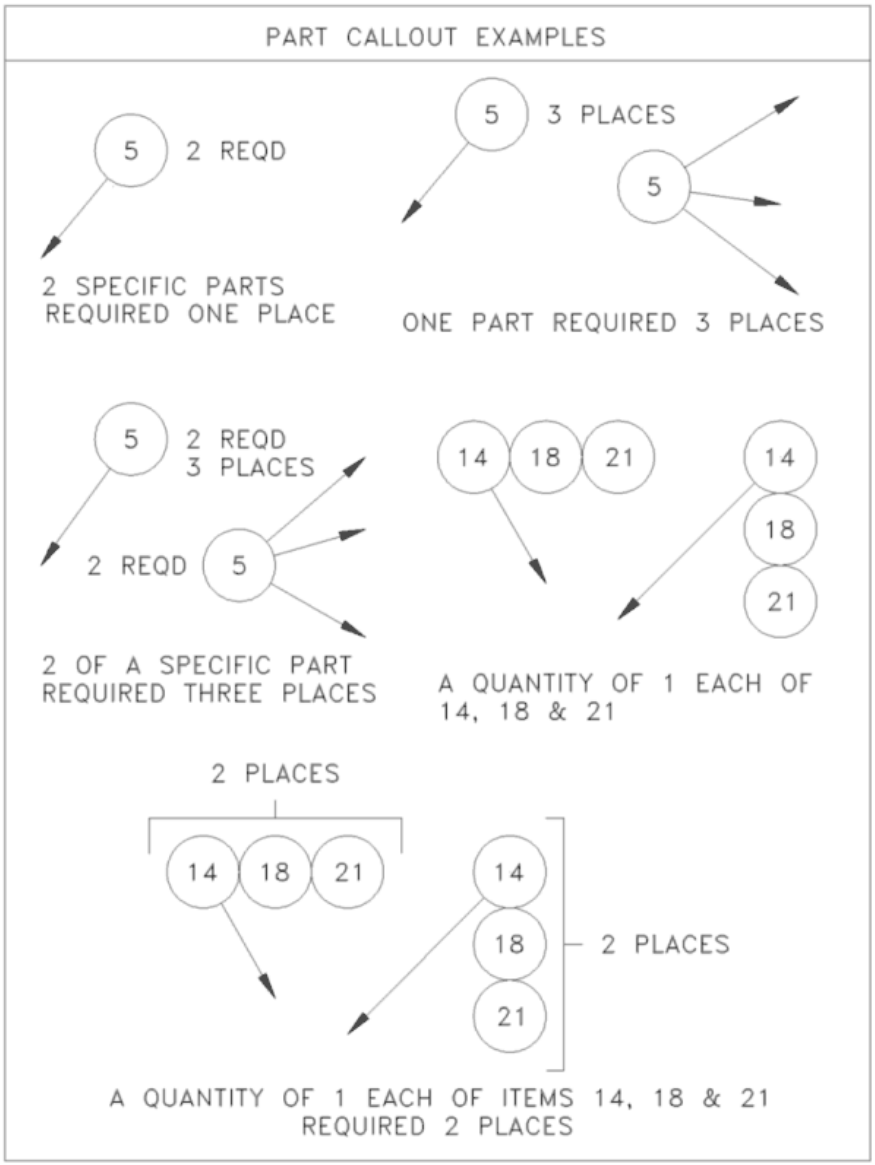
ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

Example F-2. Single/Stacked Item Call-Outs.



ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

Example F-3. Single/Stacked Item Call-Outs.



ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

F. Parts List Vertical Spacing

To describe the part adequately, the Parts/Materials List vertical spacing may vary as required. Minimum spacing should not be less than 10 mm (.38") as shown by Example F-1.

G. Applied Material

Applied material (see Attachment G, Glossary), when required for fabrication, assembly, or installation, should be identified in the General Notes with any required application instructions, unless covered by a separate specification.

H. Optional/Alternate Parts/Materials

The words "or equal" are not to be used for parts or material substitution on drawings. Optional or alternate materials may be provided for on engineering drawings in the following ways:

By referencing multiple brands/materials in the Parts List and/or in the field of the drawing, as applicable.

By specific instructions for optional or alternate items placed in the General Notes.

I. Quantity - Quantity Required Column

The quantities (number of items required) are always for one arrangement, one installation, or one assembly only.

J. Counted Quantities

Counted quantities are to be accurate and described in customary trade units.

K. As Required (AR)

Use AR only when an exact quantity is not known or cannot be easily predetermined (e.g., piping, structural steel shapes, tubing, shims, gasket material).

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

L. Identifying Assemblies

For ease in identifying assemblies, place an X in the quantity (QTY) column where the assembly is placed. The X can be used to quickly identify the items required for the assembly and to indicate that all the quantities in that column are for that assembly.

M. Reference Designation Column

This column should be used when unique identifiers are required. When used, the designator must correspond with the designator used in the field of the drawing. The width of the column is to be determined by the information required in the column (see Example F-4).

Example F-4. Parts/Materials List Example (Reference Designation).

PARTS/MATERIAL LIST

QTY -020	REQD -010	REF DES	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHT	ITEM NO
	X			INSTALLATION			1
							2
	1	SW-EV-CS-2	10250T1371	SWITCH, OPR, 3 POSN, SPR RTN FR RIGHT	CUTLER HAMMER		3
	3	SW-P-X37 SW-P-X36-1 SW-P-X36-3	10250T20KB	SWITCH, SELECTOR, 2 POSN MAINTAINED, 1 NO-1 NC CONTACT OIL TIGHT	CUTLER HAMMER		4
	7	DS-11,13,16,18, 19,20,21	10250T37R	INDICATING LIGHT, 120 VAC, XFMR TYPE WITH 6V LAMP & RED LENS, OIL TIGHT, PRESS TO TEST	CUTLER HAMMER		5
	2	DS-12,14	10250T37G	INDICATING LIGHT, 120 VAC XFMR TYPE WITH 6V LAMP & GREEN LENS, OIL TIGHT, PRESS TO TEST	CUTLER HAMMER		6
	1	BQ-C5	G0-405	TOTALIZER, DIGITAL, 110 VAC WITH EXTERNAL RECTIFIER	MOORE INDUSTRIES		7
	1	PS2	111-24-125	POWER SUPPLY, 115 VAC/24 VDC, 125 WATT	RONAN		8
	1	LELL-X37	4130-0X-601	PROBE, LEVEL ASSY WITH CABLE PROBE, WITH ENCLOSURE LENGTH: 145.5"	ENDRESS HAUSER		9

AR

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

N. Part/Dash Number Column

See Section 4.22.4 and Attachment G, Glossary.

O. Vendor Part Number

Vendor part numbers are the manufacturer's part numbers (see Vendor [Supplier] Item in Attachment G, Glossary).

NOTE: The manufacturer's part number is to be used for commercial items. When only a distributor/vendor, e.g., McMaster Carr, Hanford Stores is known as a source, catalog numbers are noted as reference (in parentheses) in the Description Column or Material/Reference Column.

P. Nomenclature/Description Column

Enter the basic name (a noun name) first. The noun name is a noun or noun phrase that best establishes the basic concept of the item. It describes what the item is and what it is used for, not the material or method of fabrication. A compound noun or noun phrase is used only when a single noun is inadequate.

BASIC NAME EXAMPLE	
Bracket	(noun)
Piston	(noun)
Gear Box	(noun phrase)
Terminal Board	(noun phrase)

Use modifiers only when there is more than one type of the basic item used in the assembly (e.g., where two brackets are identified in an assembly, identified as bracket, mounting, and bracket, support).

Q. Description (Vendor [Supplier] Item)

Specify parts to obtain the most cost-effective item. Where possible, use generic descriptions rather than brand names. The description is to specify characteristics that are sufficient for intended end use, but still broad enough in definition to permit open purchasing.

ATTACHMENT F – PARTS/MATERIALS LIST (cont.)

R. Hardware and Material Items

List basic names with required modifiers for fasteners and materials (e.g., SCH CAP SCR, ¼-20-UNC-2A, etc.). As required, list material items by form and size description (e.g., TUBE STEEL, 4 X 4 X ¼; PLATE, 2 THK).

S. Material/Reference Column

List the controlling specification for the required material (e.g., ASTM, ACI) followed by the kind of material (e.g., SST, 6061-T6A, CS). Never use the word "COMMERCIAL" to indicate any acceptable grade. The words "ANY GRADE" may be used where the grade of material is not a design factor. Always identify the specific material grade when welding is required. List names of supplier for commercial items, other separate documents controlling material, general notes, etc.

T. Sheet Column

For improved readability, always use this column to note where assemblies, arrangements, or detailed items are depicted on a multi-sheet drawing.

U. Item Number Column

Enter consecutive numbers starting with the numeral 1. An item number should always be used for each vertical space, including spaces left blank for future use.